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Education as a Preparation for Work:

an investigation of an episode

of mathematics curriculum development in Ireland

based upon the participant objectivation

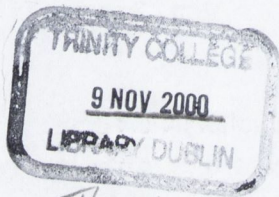methodology of Pierre Bourdieu

Two Volumes

VOLUME II

JOHN EVANS

A Thesis Submitted for the degree of

Doctor of Philosophy

University of Dublin

1999

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VOLUME TWO

2

Appendix A

Vygotsky and the Social Basis of Learning

A.1. L. S. Vygotsky [1]

Vygotsky (1896 - 1934) was a Russian Marxist psychologist interested in the establishment of his discipline as a science and in its potential for solving practical problems.[2]   A concern about pedagogical problems is always present in his work.[3]   Co-workers during his life included Luria, Leontiev, Levina, Slavina, Zeigarnik, Menchinskaya, Elkonin, and Rubinstein.[4]   During the latter period of his life he sought solutions to the serious problems of Soviet society, such as education to counter a high rate of illiteracy and the problems of defectology (research on disabilities).[5]   Following his death from tuberculosis in 1934, his works were banned by the Stalinist government.[6]   These works began to be reissued in 1956.[7]

Bruner writes:

> The two men who made the *development* of "mind" interesting to me were Jean Piaget...and Lev Semyonovich Vygotsky.[8]
> ...I first encountered (Vygotsky) in the late 1940s, reading a celebrated paper by him ...on thought as developing through the internalization of speech.[9]
>
> ...in 1961, after his official "rehabilitation" in Russia and a great deal of backing and filling diplomatically to obtain rights, his *Thought and Language* was translated into English by my colleague Eugenia Hanfmann. She asked me to write a preface. I read with new absorption...because I became caught up in its complex dialectic...

[1] Vygotsky, L. S. *Thought and Language*, trans. and ed. E. Hanfmann and G. Vakar (Cambridge, MA: MIT Press, 1962). *Mind in Society: The development of higher psychological processes*, ed. M. Cole, V. John-Steiner, S. Scribner, and E. Souberman (Cambridge, MA: Harvard University Press, 1978). *Thought and Language*, ed. A. Kozulin (Cambridge, MA: MIT Press, 1987). *Collected Works*, ed. R. Rieber, and A. Carton, trans. N. Minick, Vol. 1: *Thinking and Speech* (New York:Plenum, 1987). (Original work published in Russian in 1934). (Note the change in the title: from *Language to Speech*). Much of the following discussion draws on Luis C. Moll, ed., *Vygotsky and Education* (Cambridge: Cambridge University Press, 1990), which contains an extensive bibliography of works by and on Vygotsky in Russian, Spanish, and English.

[2] G. Blanck, "The Man and his Cause", in *Vygotsky and Education*, ed. Luis C. Moll (Cambridge: Cambridge University Press, 1990), p. 38.

[3] Ibid., p. 38.

[4] Ibid., pp. 39 - 42.

[5] Ibid., p. 40.

[6] Ibid., p. 43

[7] Ibid.

[8] Jerome Bruner, *In Search of Mind - Essays in Autobiography* (New York: Harper, 1983), p. 136.

[9] This must be L. Vygotsky and A. Luria, "The Function and Fate of Egocentric Speech". *Proceed. of the Ninth Intern. Congr. of Psychol..* (Princeton: Psychol. Rev. Company, 1930).

What captivated me most was his approach to the role of context in mental growth. It was the avoided topic in Piaget. Vygotsky begins with a paradox: "Consciousness and control appear only at a late stage in the development of a function, after it has been used and practiced unconsciously and spontaneously. In order to subject a function to intellectual and volitional control, we must first possess it".[10] What then *aids* the child to gain control?

Vygotsky's sketch of an answer was incorporated in an idea with the drab name "zone of proximal development." It consists in the child's capacity to use hints, to take advantage of others helping him organize his thought processes until he can do so on his own. By using the help of others, he gains consciousness and perspective under his own control, reaches "higher ground." "The new higher concepts transform the meaning of the lower. The adolescent who has mastered algebraic concepts has gained a vantage point from which he sees arithmetic concepts in a broader perspective.[11]

The import of the claim that in order to subject a function to intellectual and volitional control, *the child must first possess it*, gets lost in the transition to the question: What then *aids* the child to gain control?

The "others" mentioned here are not simply figures in a landscape. Whether they are friends, parents, other adults, or adults specially trained for the purpose, these transactions are social, and central to the zone of proximal development.[12] As such, these transactions are part of the historical expression and growth of the human culture from which Man springs.[13] Mental development is thus, in essence, a sociogenetic process.[14] Blank writes:

> This process occurs during the course of ontogenetic development as carried out in the social activities of children with adults, the conveyors of social experience. Social activity and practical actions also facilitate the internalization of sensorimotor

[10] This quote is from *Thought and Language,* p. 90.

[11] Bruner, pp. 139-40. This quote is from *Thought and Language,* pp. 114-115. *Thought and Language* was published in 1962. Bruner sees this period in his own work as a drawing away from Geneva (Piaget) and a drawing closer to Moscow (Vygotsky, Luria). Luria visited Bruner in Harvard in 1960. "It was with him that I could talk and correspond about Vygotsky's ideas *and my variants of them*", pp. 143-4 (my emphasis added). Bruner's *Studies in Cognitive Growth* was published in 1966 and dedicated to Piaget. The book was presented to Piaget in Moscow at the XVIIIth International Congress of Psychology. "It was plain that Piaget did not like the book much", p.146. Given the impact of Bruner's work in the United States and internationally, this element of the influences on his thought surely deserves further work.

[12] L. S. Vygotsky, "The Genesis of Higher Mental Functions", in *The Concept of Activity in Soviet Psychology*, ed. J. V. Wertsch (White Plains, NY: Sharpe, 1981), pp. 144-188.

[13] J. Bruner, Prologue to *Collected Works*, ed. R. Rieber, and A. Carton, trans. N. Minick, Vol. 1: *Thinking and Speech* (New York:Plenum, 1987), pp. 1 - 2.

[14] G. Blank, "The Man and his Cause", in *Vygotsky and Education*, p. 44.

schemas, important in grasping social meanings.[15]

"Mind" is thus historical and contingent:

> The structures of perception, voluntary attention, and memory, emotions, thought, language, problem solving, and behaviour acquire different forms according to the historical context of the culture, its relationships, and its institutions.[16]

In the formal classroom, the essential characteristic of instruction is to be the introduction of conscious awareness into many domains of activity; that is, children acquiring control and mastery of psychological processes through the manipulation of tools of thinking such as reading and writing.[17] The students acquire what Bruner calls a "loan of consciousness".[18]

The attempt to shape development and to give it direction was unproblematic for Vygotsky, within the context of post-revolutionary Russia: the point was to reach beyond, to advance the processes of human knowledge, to form a new person.[19] In Bourdieu's terms this is *coercion*.

The initiative to translate Vygotsky's outlook and practice into the context of contemporary schooling in the English-speaking world has been taken mainly in the United States. The impact of the publication of *Thought and Language* in 1962 was such that by 1978 it could be said that Vygotsky "...has figured prominently in American psychology".[20] The translation and preparation of the materials which formed the publication of *Mind in*

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[15] Ibid. "..sensorimotor schemas, important in grasping social meanings" seems very like Bourdieu's habitus.

[16] Ibid.

[17] Luis C. Moll, ed., *Vygotsky and Education* (Cambridge: Cambridge University Press, 1990), pp. 14-15.

[18] J. S. Bruner, *Actual Minds, Possible Worlds* (Cambridge, MA: Harvard University Press, 1986), p. 132.

[19] A. Rosa and I. Montero, "The Historical Context of Vygotsky's Work: A Sociohistorical Approach", in *Vygotsky and Education*, p. 81. These authors add: "...this has a particular relevance when innovative educational programs are developed". Ibid.

[20] V. John-Steiner and M. Cole, Preface to *Mind in Society*, by L. S. Vygotsky, ed. M. Cole, V. John-Steiner, S. Scribner, and E. Souberman (Cambridge, MA: Harvard University Press, 1978), p. ix.

Society - The Development of Higher Psychological Processes in 1978 also had an impact by bringing together a group of scholars for a period of five years to work on the project.[21] The experience was such that two of them, Vera John-Steiner and Ellen Souberman prepared an *Afterword* to that publication, effectively setting out a programme of research.[22] In any event, research directed towards classroom (and outside the classroom) practices grew. One publication is particularly relevant to this stage of the present work: *Children's Learning in the Zone of Proximal Development: New Directions for Child Development*.[23]

A.2 American Views of Vygotsky - The Zo-ped and The Construction Zone

Wertsch and Rogoff stress that Vygotsky's claim is not simply that the individual's mental processes develop in a social milieu.[24] Rather, the individual's mental processes have specific organisational properties that reflect those of the social life from which they derive:

> The composition, structure, and means of action are internalized from their social origins. This means that variation in the organization of social functioning can be expected to lead to variation in the organization of individual psychological functioning. ...to understand individual cognitive growth it will be fruitful to examine specific patterns of social interaction in which children participate.[25]

Such a formulation seems very like Bourdieu's development of the work of Durkheim amd Mauss: the claim that there is a correspondence between cognitive and social structures in

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[21] Ibid. Work was initiated at the prompting of Luria, ibid., p. ix.

[22] Vera John-Steiner and Ellen Souberman, Afterword to *Mind in Society*, by L. S. Vygotsky, ed. M. Cole, V. John-Steiner, S. Scribner, and E. Souberman (Cambridge, MA: Harvard University Press, 1978), pp. 121 - 133.

[23] B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* (San Francisco: Jossey - Bass, 1984). Wertsch had advised on the translation of the more complex of Vygotsky's formulations in *Mind in Society*; another contributor, Cole, was one of the editors and translators of that work. Bruner also contributed to Rogoff and Wertsch's book. This book is very familiar to this author: some of the material was adapted to produce an assessment procedure for students with low attainment in Mathematics: J. Evans, "Low Attainment in Mathematics Amongst Post-Primary School Children (12 to 18 years)", paper presented at the European Congress of the Dyslexia Association, Aachen, 20 - 23 September 1990; this book provided the source material for a two lecture element on Vygotsky's school in a contribution to the Mathematics Methods course for the Higher Diploma in Education in Trinity College, Dublin from 1991 onwards.

[24] Ibid., p. 2.

[25] Ibid.

modern societies, a correspondence produced in the main by the school system.[26]

Bourdieu argues that the correspondence between objective structures and cognitive structures is expressed in the correspondence between the *relation* of the relative positions of groups within a field, and the *relation* between the differing cognitive structures of the groups.[27] These cognitive structures are not forms of pure consciousness but *habitus - dispositions of the body* engendered by upbringing and, in modern states, the action of the school system.[28] While Wertsch and Rogoff's formulation that "variation in the organization of social functioning can be expected to lead to variation in the organization of individual psychological functioning. ...to understand individual cognitive growth it will be fruitful to examine specific patterns of social interaction in which children participate" [29] provides an intermediary role for something resembling *habitus*, the focus is on the individual, rather than on how *shared* dispositions arise, as in Blanck's "sensorimotor schemas, important in grasping social meanings" [30]

A key concept for Wertsch and Rogoff in an examination of specific patterns of social interaction in which children participate is the ZPD - *zone of proximal development.*[31]

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[26] P. Bourdieu, " Systems of Education and Systems of Thought", *Social Science Information* 14 (1967), no. 3: 338 - 58, cited in Pierre Bourdieu and Loic J. D. Wacquant, *An Invitation to Reflexive Sociology*, op. cit, p. 12. Also included are: the view that mental schemata are to be treated as the physical embodiment of social divisions; the belief that the correspondence between structures serves a political end, in that it gives an appearance of naturalness and necessity, rather than historical contingency, to social divisions; and that, in consequence of this last, cognitive structures and systems of classification are produced by, and are a stake in, the power relations between groups and classes. See Pierre Bourdieu and Loic J. D. Wacquant, *An Invitation to Reflexive Sociology*, p. 14.

[27] Ibid., pp. 15 - 19.

[28] Pierre Bourdieu, *Practical Reason*, pp. 54 - 55.

[29] B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development*, p.2

[30] G. Blanck, "The Man and his Cause", in *Vygotsky and Education*, p. 44.

[31] Wertsch gives zone of closest or nearest development as a literal translation of *zona blizhaishego razvitiya.*, B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development*, p. 1.

He (Vygotsky) was concerned with the relationship between two levels of development: a child's level of individual, independent functioning (the level of "actual development") and the level at which he or she can function while participating in instructional social interaction (the level of "potential development"). It is these two levels of task performance that define the boundaries of the zone of proximal development.[32]

A consequence of this view is that traditional forms of assessment (of isolated activity by the child) give information about "where the child has been". That is, the assessment is incomplete in that it attempts to assess "actual development" only; an element of assessment should also attempt to assess the levels of activity possible for the child with adult assistance.[33]

A further consequence of the ZPD view is that "instruction" (*obuchenie*: " the teaching-learning process") should proceed ahead of development....It is in this way that instruction plays an extremely important role in development". [34] Further,

[Instruction] rouses to life, awakens, and sets in motion a variety of internal processes of development in the child. At this point, these processes are still possible for the child in the sphere of interaction with surrounding people and in the sphere of collaboration with peers. But these processes, which constitute the course of internal development, then become the internal property of the child himself or herself.[35]

The substance of Rogoff and Wertsch's book consists of research reports of work with infants, preschoolers, school-age children, and adolescents observed at home, at school, at work, and in the laboratory.[36] While Vygotsky was mainly concerned with the specific properties of the relationship between "instruction" and development during the school years of children, the broader project of understanding the *general* nature of this relationship was

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[32] Ibid., p. 2.

[33] Ibid. p. 3. A discussion on the forms such assessment might take is given in A. L. Brown and L. A. French, "The Zone of Proximal Development: Implications for Intelligence Testing in the Year 2000", *Intelligence* 3 (1979), 255-277.

[34] L. S. Vygotsky, *Selected Psychological Investigations* (Moscow: Izdstel'sto Akademii Pedagogicheskikh Nauk SSSR, 1956), p. 278, cited by B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* , p. 3.

[35] Ibid., p. 450, cited by B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* , p. 4.

[36] Ibid., p. 5.

also of interest.[37]   Though the research reported in Rogoff and Lave embraces this larger project, three themes are found to be shared:

- ZPD involves the joint consciousness (intersubjectivity) of the participants.

Corollary: Participants do not have the same definition of the task or of the problem to be solved. Through interaction, the child's notion of what is to be done goes beyond itself, with the adult's support, and comes to approximate in some degree that of the more expert adult.

- Both parties (adult and child) play a role in the ZPD, even if the situation is not one of formal instruction.

The *child* provides developing skills and particular interests, and participates with the adult in organizing the direction and pace of interaction in the ZPD.

The *adult* has responsibility for segmenting the task into manageable subgoals compatible with expert performance. However, there may be mismatches with both the actual and potential level of activity of the child.[38]

- Interaction in the ZPD is organized into a *dynamic functional system* [39] oriented towards the child's future skills and knowledge. The functional system of adult - child joint participation in problem solving is organized by the task definitions, promoted activities, and hard and soft technologies available through culture.[40]

Wertsch expresses concern that the "insightful but cryptic" notion of the ZPD does not distinguish between say, an episode involving the teaching-learning of division (How many times...? What about the remainder...? etc.) and an episode involving the moving of digits

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[37]   L. S. Vygotsky, *Selected Psychological Investigations* (Moscow: Izdstel'sto Akademii Pedagogicheskikh Nauk SSSR, 1956), p. 446, cited by B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* , p. 5.

[38] Thus, "instruction" is a form of assessment.

[39] "The presence of an invariant task, performed by variable mechanisms, which bring the process to a constant invariant conclusion, is one of the basic features distinguishing the work of every "functional system". The second distinguishing feature is the complex composition of the functional system...", A. R. Luria, *The Making of Mind* (Cambridge, MA: Harvard University Press, 1979), p. 124. The concept comes from the work of the psychologist-physiologist P. K. Anokhin. See P. K. Anokhin, "Cybernetics and the Integrative Activity of the Brain", in M. Cole and I. Maltzman, ed., *A Handbook of Contemporary Soviet Psychology* (New York: Basic Books, 1969).

[40] B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* , p. 5.

on a page (the 5 goes up there...now take the 3 down under the 7 ...etc.).[41]   He proposes some additional theoretical constructs: *situation definition*, *intersubjectivity*, and *semiotic mediation*.[42]

The construct *situation definition* arises from the possibility that the adult and child often understand a context in such different ways that they are not really doing the same task. When (and if) this becomes clear, typically by a feedback, a *transitional task* may emerge (set by the adult) which is intended to provide a step on the route to the child and the adult having the same understanding of the task.[43] Wertsch sees the completion of this steps by the child "...in terms of the sudden insight experience examined by Gestalt psychologists..."[44]

The construct *intersubjectivity* arises from Vygotsky's insistence that "...instruction *creates* a zone of proximal development".[45]   Outcomes are never a function of the child's ability only, the activity of the adult makes a contribution - this is, after all, *interactive* learning. *Intersubjectivity*, then, is a scale of sorts, indicating at one extreme, totally different notions of the task, and at the other, a complete agreement ("...representing objects and events in the same way...").[46] The creation of the transitional task does not mean that the adult has abandoned previous beliefs; rather, it reveals the asymmetry in the relationship between adult and child. The adult is willing to do what is necessary to carry out the

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[41] It would be hard to reconcile the second episode with Vygotsky's notion that "...the child who has mastered algebraic concepts has gained a vantage point from which he sees arithmetical concepts in a broader perspective", L. S. Vygotsky, *Thought and Language*, pp. 114-115. These matters will be reconsidered in Part 3 of this work.

[42] J. V. Wertsch, "The Zone of Proximal Development: Some Conceptual Issues" in B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* , p. 8.

[43] Wertsch calls this a "second situation definition". The term *transitional task* comes from J. Evans, "Formal and Dynamic Assessment of Learning Difficulties in Mathematics", paper presented at the regional conferences of the Association for Children and Adults with Learning Disabilities, April - September, 1991.

[44] This issue is discussed further when dealing with the work of Cole *et al*.

[45] L. S. Vygotsky, *Selected Psychological Investigations* (Moscow: Izdstel'sto Akademii Pedagogicheskikh Nauk SSSR, 1956), p. 450, cited by B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* , p. 12.

[46] J. V. Wertsch, "The Zone of Proximal Development: Some Conceptual Issues" in B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* , p. 12.

communicative task in hand. "In an important sense, the adult continues to represent the objects and events in a way that is appropriate for mature members of the culture. The only genuine, lasting situation redefinition that takes place occurs on the part of the child".[47]

The construct *semiotic mediation* arises from the fact that intersubjectivity is often *created* through the use of language, rather than simply *named* by language. That is, speech by the adult is a bid to initiate the child's activity at a certain level of intersubjectivity. The child's reply is also a bid, a replying bid.[48] This image of Wertsch's is very attractive, but predicated upon a strong sense of ease, of mutuality, in the teaching-learning situation. Further, it should be noted that while the emphasis here has been on linguistic *signs* (speech and language), Vygotsky's formulation deals with human interaction on the basis of other signs as well; for example, "...various systems for counting; mnemonic techniques; algebraic symbol systems; works of art; schemes; diagrams; maps and mechanical drawings; all kinds of conventional signs".[49] Wertsch refers to the phenomenon of *joint eye gaze* (a sign) between infant and mother as the basis of *attention* , predicated on little more than the existence and identity of objects.[50] *Any further development of intersubjectivity is dependent on the acquisition of such "basic" capacities.* The possibility arises that what is taken to be basic may not be universally possessed.

Griffin and Cole also contributed to Rogoff and Wertsch's book.[51] As with Wertsch, they feel that the cryptic nature of some of Vygotsky's writings has left some matters unclear. Moreover, the difficulties of translation from Russian, allied with the very different cultural background, present barriers to understanding.[52]

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[47] Ibid., p. 13. The emphasis is on the situational. The adult may learn how to better create transitional tasks.

[48] Ibid., p. 14.

[49] L. S. Vygotsky, "The Instrumental Method in Psychology", in *The Concept of Activity in Soviet Psychology*, ed. J. V. Wertsch (White Plains, NY: Sharpe, 1981), p. 137.

[50] J. V. Wertsch, "The Zone of Proximal Development: Some Conceptual Issues" in B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development* , p. 16. The point here is that the infant's gaze follows the mother's - the child learns to *attend* to an object.

[51] Peg Griffin and Michael Cole, "Current Activity for the Future: The Zo-ped" in B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development*, pp. 45-64.

[52] Ibid., pp. 45-46.

Research takes on a life of its own, and the study of Vygotsky in America has been no exception. Griffin and Cole identify a variety of concepts in the American developmental literature that are identified as alternative formulations of the Zo-ped concept.[53] Griffin and Cole sought to benefit from the work of Luria, who wrote extensively about the historical, theoretical, and professional climate within which both he and Vygotsky worked. Arising from this, Griffin and Cole identify the work of Bernstein, Anokhin, and Leont'ev as being of importance in gaining a better understanding of Vygotsky's concept of the ZPD or *Zo-ped*.[54] Interestingly, they identify a belief common to Tolstoy, Vygotsky, and Dewey that education should be a transforming experience.[55]

In the light of their research, Griffin and Cole express reservations about two currents of research and activity in America. These trends are identified as "next-step" and "scaffolding" versions of the Zo-ped, associated with Hunt, Turiel, and Siegler and Bruner and Wood respectively.[56]

In contrast to the view of Hunt et al. that children's development could be enhanced if their environments provided just the right amount of discrepancy between their prior achievements and present demands, Griffin and Cole argue that Zo-peds are expected to embody several levels of the task at once, both next steps and previous steps:

> Real-life settings...seem better served by the notion that the child is in an apprenticeship situation where adults create and support several levels of participation. In such situations, development is more appropriately viewed as changes in responsibility for certain steps than as their presence or absence.[57]

[53] Ibid., p. 46.

[54] Ibid., p. 48. These issues have been discussed already in the commentary on feedback, functional system, and transitional task.

[55] Ibid. Bourdieu, too, is interested in the transforming effects of education, particularly when the aim of the enterprise is to acquire universal forms of knowing; however, unlike Dewey et al, Bourdieu insists in his relentless way that this transformation has a coercive aspect.

[56] J. M. Hunt, *Intelligence and Experience* (New York: Knopf, 1961). E. Turiel, "Stage Transition in Moral Development", in R. M. Travers, ed., *Second Handbook of Research on Teaching* (Chicago: Rand McNally, 1972). R. S. Siegler and D. D. Richards, "The Development of Intelligence", in R. Sternberg, ed., *Handbook of Human Intelligence* (New York: Cambridge University Press, 1981). D. J. Wood, "Teaching the Young Child: Some Relationships Between Social Interaction, Language, and Thought", in D. R. Olson, ed., *The Social Foundations of Language and Thought* (New York: Norton, 1980).

[57] Peg Griffin and Michael Cole, "Current Activity for the Future: The Zo-ped" in B. Rogoff and J. V.Wertsch, *Children's Learning in the Zone of Proximal Development: New Directions for Child Development*, pp. 46-47.

The view of Wood and Bruner is presented as follows: adult tutorial interventions should be inversely related to the child's level of task competence, so that the more difficulty the child had in achieving a goal, the more directive the interventions of the tutor should be. Griffin and Cole view this notion of "scaffolding" as a somewhat limiting metaphor if the object of the process is to bring about changes in the child, not demonstrate the adult's wisdom.[58]

Griffin and Cole report on initiatives they and their colleagues at the Laboratory for Comparative Human Cognition (LCHC) have taken to conduct a "serious examination of cognition outside laboratories and schools and to see the variations in thinking with which humans provide themselves as a hedge against unknown ecological presses".[59] They record divergences in which development occurs in a variety of leading activities:

> The adult role in the functional system differs from activity to activity. It does not always provide support for a stepwise progression, and it does not always assume the executive or higher-order functions. We see the difficulties in getting subjects to discover tasks in different activity settings, *even in getting them to engage in the activity at all*, but exactly these difficulties are the occasions for us to see the movements, the new creations of a developing organism.[60]

Another issue raised by the communication of 15th. October, 1994, is that of *context free-learning*. This issue arose out of the specific interest in a work edited by Rogoff and Lave.[61]

A.3 Context-Free Learning: Rogoff and Lave

Rogoff indicates her reservations about theories of development by stages which assume that the stage or capacity characterises the person's thinking across a large number of task situations; on the contrary, the capacity to use cognitive skills at tasks whose solutions have a similar logical structure is often found to appear at different ages, and seems to fluctuate as

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[58] Ibid., p. 47.

[59] Ibid., p. 62.

[60] Ibid.

[61] B. Rogoff and J. Lave, ed., *Everyday Cognition: its development in social context* (Cambridge, MA: Harvard University Press, 1984). Emphasis added.

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a function of the situation, suggesting that such skills may be limited in their generality.[62] In particular, children sometimes demonstrate better developed cognitive skills in contexts that are familiar to them.[63] Rogoff concludes that *thinking is intricately interwoven with the context of the problem to be solved.*[64]

People do apply knowledge acquired in one context to other contexts. How does this happen? Rogoff wishes to shift attention away from the notion of the lack or extent of a person's capacity to generalise knowledge, and towards the person's act of *interpretation of the context of activity* as blocking or facilitating the application of skills developed elsewhere. Such interpretation requires, for Rogoff, consideration of the goal of the activity, and the interpersonal and cultural aspects of it.[65] The theory of Vygotsky, as discussed above, provides a view of social context affecting cognitive activity at two levels: sociocultural history provides tools and practices which facilitate solving problems; and the immediate interactional context structures individual cognitive activity through contact with more experienced members of the society.[66]

The cognitive development of the child is, for Rogoff, "channelled" or "guided" by social interaction to adapt to the intellectual tools and skills of the culture of the social system in which the child is "embedded".[67] This view seems similar to that of Bourdieu.

The contributions in Rogoff and Lave's work concern three themes: problems of determining the situational specificity and generality of cognitive skills; the role of the "social orchestration" of thinking, mediated by cultural institutions, normative techniques of solving problems, and the transfer of cognitive skills from one person to another; and the practical, opportunistic nature of everyday cognitive activity.[68] With regard to the latter,

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[62] B. Rogoff, "Introduction: Thinking and Learning in Social Context", in B. Rogoff and J. Lave, ed., *Everyday Cognition: its development in social context* (Cambridge, MA: Harvard University Press, 1984), p. 1. The classic theory of developmental stages is, of course, that of Piaget.

[63] Ibid., p. 2.

[64] Ibid.

[65] Ibid., p. 4.

[66] Ibid.

[67] Ibid.

[68] Ibid., pp. 5 - 6.

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Rogoff observes:

> ...what is regarded as logical problem solving in academic situations may not fit with problem solving in everyday situations, not because people are "illogical" but because practical problem solving requires efficiency rather than a full and systematic consideration of all alternatives.[69]

(It may be recalled that the LCA documentation made a distinction between the *understanding of concepts* in General Education and *precision and quality* in Vocational Education.[70]) Two very striking studies of such everyday problem solving, involving arithmetic, are those of S. Scribner[71] and Lave, Murtaugh, and de la Rocha[72].

Rogoff sees several methodological implications in seeking to examine the tie between cognitive skill systems and the intellectual demands of a given activity. The study should take place in the field of activity, and *the activities* themselves need to become objects of cognitive analysis:

> What intellectual tasks do these practices pose? What knowledge do the various tasks require, and what intellectual operations are involved in their accomplishment?[73]

In sum it may be said that there is a body of research showing that people often perform tasks better in practical scenes of activity than on paper and pencil tests; that sense and meaning characterise such activities for the participants; and that analysis of such activity

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[69] Ibid., p. 7. This is Plato's view recast.

[70] See the discussion in Chapter Nine.

[71] S. Scribner, "Studying Working Intelligence", in in B. Rogoff and J. Lave, ed., *Everyday Cognition: its development in social context* (Cambridge, MA: Harvard University Press, 1984), pp. 483 - 500.

[72] J. M. Lave, M. Murtaugh, and O. de la Rocha, "The dialectic of arithmetic in grocery shopping", in in B. Rogoff and J. Lave, ed., *Everyday Cognition: its development in social context* (Cambridge, MA: Harvard University Press, 1984).

[73] Ibid., p. 14.

requires examination of its context and the intellectual operations involved.[74]

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[74] Still, in Bourdieu's view, this approach is incomplete: "I feel a kinship and a solidarity with researchers who "put their noses to the ground"...even though I cannot agree with the philosophy of the social world which often undergirds their interest in the minutiae of daily practices and which, in this case, is in fact imposed upon them by this "close-up view" and by the theoretical myopia or the blindness to objective structures, to relations of force that are not immediately perceivable, that this view encourages", Pierre Bourdieu and Loic J. D. Wacquant, *An Invitation to Reflexive Sociology*, p. 14.

Appendix B

Document 1 - Development Officer 25/1/95

The mathematical content of the LCA course as proposed by meetings in Dublin and Limerick of teachers involved in the vocational specialisms, organised under a variety of headings, and distributed over the two years of the programme.

Year One	Year Two
1. Use of Calculator 1	1. Weights & Measures 2
2. Time and Travel	2. Exchanges Rates 2
3. Decimals/fractions/percentages	3. Use of Calculator 2
4. Ratio and Proportion	4. Use of ready reckoner and measuring devices
5. Estimates and approximations	5. Wages 2
6. Budgeting/Costing/Planning	6. Geometry 2
7. Statistics 1	7. Area
8. Temperature conversions	8. Volume
9. Measurement/Scales	9. Time, Speed, Distance
10. Probability 1	10. Problem Solving
11. Geometry 1	11. Probability 2
12. Wages 1	12. Statistics 2
13. Weights & Measures 1	13. Home Finance

Year 1

1. Use of Calculator 1

The student should be able to:

1.1 Competently use the numeric pad and function keys including memory.

1.2 Perform the operations +,-,x,÷.

1.3 Decide in problem type questions which operations are appropriate and apply them.

1.4 Recognise a place value.

1.5 Express numbers in word and digit form.

1.6 Round off large numbers.

1.7 Use proper method of writing calculations.

1.8 Calculate common practical problems related to the module using a calculator.

2.   Time and Travel

The student should be able to:

2.1   Read time from the traditional clock and 24 hour clock.

2.2   Convert between the two time systems.

2.3   To add and subtract in the 24 hour system.

2.4   Apply knowledge to travel timetables, work rosters, etc.

2.5   Interpret a timetable e.g. bus, train and calculate journey times.

2.6   Name and recognise common currencies within the EU and America.

2.7   Be able to convert simple exchange rates - sterling/franc

3.   Decimals/Fractions/Percentages

The student should be able to:

3.1   Add, subtract, multiply, and divide decimals and fractions.

3.2   Find simple percentages.

3.3   Interchange decimals/fractions/percentages.

3.4   Recognise the equivalence of common fractions, decimals and
       percentages 1/4 =25%=.25

4.   Ratio and Proportion
       The student should be able to:

4.1   Apply the concept of ratio and proportion.

4.2   Calculate quantities based on a given ratio instruction e.g. Adapt a recipe
       for 6 people to 8 or enlarge a design in a given ratio.

4.3   Use the unitary method for calculation.

4.4   Express ratios in their simplest forms.

4.5   Calculate inverse proportion.

5. Estimates and approximations

The student should be able to:

5.1 Make estimations and approximations in relation to quantity/time/cost etc. for given tasks.

5.2 Determine the total value of a collection of coins and notes and record the total.

5.3 Calculate the total cost of a number of items on a bill of charges for services and materials e.g. a car service bill, house decorating bill.

5.4 Calculate the cost of a basket of goods, tender payment and predict accurate change.

6. Budgeting/Costing/Planning

The student should be able to:

6.1 Price for a specific problem/task including the concept of wastage.

6.2 Work out a detailed time plan for completion of task.

6.3 Budget for a household when spending money is fixed.

7. Statistics

The student should be able to:

7.1 Collect data.

7.2 Classify data.

7.3 Present data in statistical form i.e. bar chart, trend chart, tree diagrams.

7.4 Interpret diagrammatical representation of data including pie charts.

8.   Temperature conversions

The student should be able to:

8.1   Read a standard thermometer.

8.2   Convert between Fahrenheit and Centigrade.

8.3   Use a conversion chart competently.

8.4   Recognise common temperatures e.g. 0°C - Freezing point. 100°C - Boiling point.

8.5   Competently use temperature dials on equipment.

9.   Measurement/Scales

The student should be able to:

9.1   Use a measuring tape/standard ruler for purpose of measuring a straight line lengths, rectangular and square figures.

9.2   Competently and accurately use weighing scales.

9.3   Competently and accurately use graduated vessels e.g. litre jug for liquid measurement.

9.4   Draw a simple sketch to a particular scale.

9.5   Convert from a simple scale drawing to real situation.

9.6   Determine the length of the perimeter of a common geometric shape.

9.7   Calculate area of rectangle using formula L x B.

9.8   Calculate area of irregular shape.

9.9   Visualise concept of gram, kg, cm, m, km.

9.10   Read and understand measurement on packaging.

10.   Probability 1

The student should be able to:

10.1   Apply the idea of probability in simple situations like selecting a
        particular dish, room etc.

10.2   To understand possible outcomes of simple random events e.g. dropping
        buttered toast.

10.3   To know that when repeating the same experiment different outcomes
        may result e.g. Tossing Coins, Coloured balls in bags i.e. apply the Law
        of Chance.

11.   Geometry 1

The student should be able to:

11.1   Use a compass to get direction.

11.2   Use a protractor to calculate size of angles.

11.3   Construct angles of given size using protractor.

11.4   Draw parallel lines.

11.5   Draw perpendicular lines.

11.6   To be able to construct rectangles/squares line lengths accurately.

12.   Wages 1

The student should be able to:

12.1   Interpret basic pay slips, gross and net wage.

12.2   Calculate overtime, time and a half, double time.

12.3   To understand clock-in card system and calculate hours.

12.4   Calculate piecework, commission etc.

13.   Weights, Measures 1

The student should be able to:

13.1   Deal with metric units of measure as applied to weight/length/capacity/area/volume.

13.2   Recognise notation for metric and imperial weights/measures.

Year 2

1.   Weights and Measures 2

The student should be able to:

1.1   Relate imperial and metric units approximately as in 1 litre=1 3/4 pints etc.

1.2   Convert from metric to imperial and vice versa.

1.3   Accurately use a conversion table.

2.   Exchange Rates 2

The student should be able to:

2.1   Carry out transactions from given conversion tables.

2.2   Understand the concept as applied in banks and use exchange rates and assess qualitatively major effects of changes in exchange rates on individuals, business and the community in general.

2.3   Distinguish between the terms "we buy" and "we sell".

3.   Use of calculator 2

The student should be able to:

3.1   Use the calculator to check all types of question based on the module topics.

3.2   Competently change signs.

3.3   Calculate roots and squares.

3.4   Carry out calculations using the memory function key.

4.   Use of ready reckoner and measuring devices

The student should be able to:

4.1   Use a ready reckoner to determine distances between towns.

4.2   Choose and use appropriate units and instruments in a variety of situations, interpreting numbers on a range of measuring instruments e.g. Tape/Rule, Digital Clocks, Speedometers, Ovens etc.

5.   Wages 2

The student should be able to:

5.1   Compute wages based on year 1.

5.2   Be familiar with terms like V.A.T., discount etc.

5.3   Calculate gross and net wage.

5.4   To understand wage deductions and additions P.R.S.I., Tax Free Allowance, Bonus payments etc.

6.	Geometry 2

The student should be able to:

6.1	Construct triangles with accuracy, given dimensions e.g. 2 sides and 1 angle, one side and 2 angles.

6.2	Construct a circle given a radius using a compass.

6.3	Construct rectangles and squares given dimensions with accuracy.

6.4	Be familiar with properties of sides and angles.

7.	Area

The student should be able to:

7.1	Competently calculate the area of a square, rectangle and circle.

7.2	Apply the concept of finding area and hence use in practical situations such as - calculate the cost of decorating, carpeting or painting a room, or - planting crops, hedging etc.

7.3	Accurately find the area of an irregular shape.

7.4	Use Simpson's Rule.

8.	Volume

The student should be able to:

8.1	Understand the concept of volume.

8.2	Calculate volume of cuboid shape L x B x H

8.3	Calculate volume of irregular shape.

8.4	Understand concept of melting/recasting maintaining volume.

8.5	Find volume of cylinder/cone/sphere/hemisphere using formulae.

9.   Time, Speed, Distance

The student should be able to:

9.1   Devise relationship between time/distance/speed. D=T x S etc.
9.2   Use the formula to find one unknown.

10.   Problem Solving

The student should be able to:

10.1   Solve problems from any of the topics listed in module 1 and module 2 to include two or more concepts e.g.Calculating given time difference between countries and applying to the idea of plane timetables, foreign exchange etc.

11.   Probability 2

The student should be able to:

11.1   Extend the concept of probability to combined events namely and/or e.g. Tossing 2 coins, 2 dice.

12.   Statistics 2

The student should be able to:

12.1   Construct a pie chart.
12.2   Interpret flow diagrams.
12.3   Calculate mean, mode, median.
12.4   Construct a cumulative frequency curve, find median, upper quartile, lower quartile and interpret results.

13.   Averages

The student should be able to:

13.1   Calculate averages from appropriate examples applicable to the
        vocational option.

14.   Home Finance

The student should be able to:

14.1   Read and interpret household bills e.g. E.S.B., Telecom, Gas etc.

14.2   Calculate units used etc.

14.3   Understand and calculate Hire Purchase.

Appendix C

The mathematical content of the LCA course as reorganized by the Development Group at a meeting in Dublin, 25th. January, 1995.

1.   Estimation.

10101 Roughly estimate the outcome of a calculation involving one of +, -, x, ÷ by rounding to the nearest whole number, 10, 100, etc.

2.   Use of Calculator 1.

10201 Perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits

10202 Obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷

10203 Correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length

10204 Express natural numbers ≤ 8 digits in word and digit form

10205 Round off natural numbers ≤ 8 digits

10206 Write an answer to a money calculation correct to the nearest penny

10207 Write a decimal number correct to a specified number of decimal places

10208 Convert a proper fraction to a decimal, correct to two decimal places

10209 Add, subtract, multiply and divide decimals

10210 Correctly use the % key to find a percentage of a number

10211 Use the √ key correctly

3.   Time.

10301 Know the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century

10302 Use and interchange the units and concepts set out in procedure 10301

10303 Read time from the traditional clock

10304 Use the a.m / p.m format for time

10305 Use the 24 hour format for time

10306 Interchange a.m / p.m format and 24 hour format

10307 Add and subtract in each time format

10308 Interpret a timetable e.g bus, train, aeroplane etc.

10309 Do simple problems involving travel timetables, work rosters etc.

4.   Ratio and proportion.

10401   Divide a quantity in a given ratio

10402   Divide a quantity in proportion eg a sum of money in proportion to age

10403   Increase and decrease quantities in a given ratio eg. cooking recipe

10404   Calculate inverse proportion eg. if it takes 3 people 6 days to build a wall,
        how long would it take 2 people to build the same wall

5.   Statistics 1.

10501   Collect and record data

10502   Classify collected data

10503   Present classified data in statistical form i.e. bar chart, histogram with equal
        class intervals, trend chart, tree diagram

10504   Interpret, without calculation, diagrammatical representation of data including
        pie chart

6.   Temperature.

10601   Take a reading from a scaled thermometer

10602   Convert between Fahrenheit, Celsius and Gas Mark using conversion tables

10603   Know the temperature of the freezing point of water, the boiling point of water
        and normal body temperature in degrees Celsius

10604   Know average seasonal temperatures (˚C) in Ireland

10605   Interpret information concerning temperature (˚C)

7.   Measurement and scales 1.

10701   Estimate the measure of everyday materials in cm / m , g / kg and ml / l

10702   Use a measuring tape / ruler to measure straight line lengths and obtain the
        dimensions of rectangular figures

10703   Record measurements on a sketch diagram

10704   Accurately use weighing scales calibrated in g / kg

10705   Accurately use graduated vessels

10706   Convert measurements from a simple scale drawing to true values

10707   Find the length of the perimeter of a rectilinear shape

8.   Measurement and Scales 2.

10801 Calculate the area of a rectangle by substituting into the formula L x B

10802 Calculate the area of a triangle by substituting into the formula

       (base x height) / 2

10803 Calculate the area of a parallelogram by substituting into the formula

       h x (a + b)/2

10804 Interpret quantitative information on labelled goods

10805 Do simple problems involving 10804

10806 Convert imperial measure of length, mass and volume to metric measure using
       an appropriate conversion table

9.   Probability.

10901 Calculate the probability of an event in simple cases, with probability treated as
       relative frequency i.e. for equally likely outcomes,
       probability = number of outcomes of interest
                     number of possible outcomes

10902 Calculate which outcome of two events is more likely by comparison of the
       probabilities expressed as decimals

10903 Calculate the expected outcome of a series of trials by multiplying the probability
       of an event by the number of trials, and distinguishing between expected
       outcome and actual outcome

10.   Geometry 1.

11001 Estimate the degree measure of an angle in the range 0 to 360 degrees

11002 Use a protractor to find the degree measure of an angle

11003 Construct a right angle using a set square

11004 Construct angles of given degree measure using a protractor

11005 Construct a rectangle to given dimensions

11006 Construct a circle of given radius using a geometrical compass

11.   Geometry 2

11101 Construct a triangle given the lengths of three sides using a geometrical triangle

11102 Construct a right angle using a 3:4:5 right angled triangle

11103 Estimate the length of the hypotenuse of a right angled triangle by construction

11104 Use the calculator to find the length, to a given accuracy, of the hypotenuse of a
       right angled triangle, using the Theorem of Pythagoras

12.   Wages 1.

11201 Convert wage to annual / monthly / weekly payments as required

11202 Interpret pay slips

11203 Calculate hours worked from a time card and calculate wage using a flat hourly
       rate of pay

13.   Wages 2.

11301 Calculate wage using piecework rates

11302 Calculate wage on the basis of commission

11303 Calculate wage based on basic hourly rate plus overtime (time and a quarter,
       time and a half, double time, treble time)

11304 Calculate taxable income, given gross pay and tax free allowance

Appendix D

The mathematical content of the LCA course, distributed over two half-year modules and organised by the difficulty of the material, its logical sequence, and the need for variety, at a meeting of the Development Group in Dublin, 26th. January, 1995.

Year One

Module 1   Module 2

Topic Number Topic Name   Topic Number Topic Name

1	Estimation	4	Ratio and Proportion
2	Use of Calculator 1	6	Temperature
3	Time	8	Measurement and Scales 2
5	Statistics 1	9	Probability
7	Measurement and Scales 1	11	Geometry 2
10	Geometry 1	13	Wages 2
12	Wages 1		

Appendix E

The mathematical content of the LCA course, constructed in response to the Steering Committee's comments, in which the coded mathematical behaviours were regrouped from a sequence of categories determined by logic and degree of difficulty, to form a sequence determined by themes at a meeting of the Development Group in Dublin, 8th. February, 1995. The new categories were six *themes* with the following working titles: *Leisure and Social Maths 1 and 2*; *Travel and Tourism Maths 1 and 2; Consumer Maths 1 and 2*; *Maths for Income and Wages 1 and 2; Communication Maths 1 and 2*; and *Maths for Home* (to include *DIY/Agriculture/Horticulture*)*1 and 2.*

Procedure	Procedure Name
10101	Roughly estimate the outcome of a calculation involving one of +, -, x, ÷ by rounding to the nearest whole number, 10, 100, etc.
10201	Perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits
10202	Obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷
10203	Correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length
10204	Express natural numbers ≤ 8 digits in word and digit form
10206	Write an answer to a money calculation correct to the nearest penny
10209	Add, subtract, multiply and divide decimals
10301	Know the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century
10302	Use and interchange the units and concepts set out in procedure 1301
10303	Read time from the traditional clock
10304	Use the a.m / p.m format for time
10305	Use the 24 hour format for time
10306	Interchange a.m / p.m format and 24 hour format
10307	Add and subtract in each time format
10308	Interpret a timetable e.g bus, train, aeroplane etc.
10309	Do simple problems involving travel timetables, work rosters etc.

10504   Interpret, without calculation, diagrammatical representation of data including pie chart

10707   Find the length of the perimeter of a rectilinear shape

10401   Divide a quantity in a given ratio

10402   Divide a quantity in proportion eg a sum of money in proportion to age

10604   Know average seasonal temperatures (˚C) in Ireland

10605   Interpret information concerning temperature (˚C)

Procedure	**Procedure Name**
10305	Use the 24 hour format for time
10202	Obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷
10203	Correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length
10204	Express natural numbers ≤ 8 digits in word and digit form
10205	Round off natural numbers ≤ 8 digits
10206	Write an answer to a money calculation correct to the nearest penny
10209	Add, subtract, multiply and divide decimals
10301	Know the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century
10302	Use and interchange the units and concepts set out in procedure 1301
10101	Roughly estimate the outcome of a calculation involving one of +, -, x, ÷ by rounding to the nearest whole number, 10, 100, etc.
10201	Perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits
10303	Read time from the traditional clock
10304	Use the a.m / p.m format for time
10306	Interchange a.m / p.m format and 24 hour format
10307	Add and subtract in each time format
10308	Interpret a timetable e.g bus, train, aeroplane etc.
10309	Do simple problems involving travel timetables, work rosters etc.

10706	Convert measurements from a simple scale drawing to true values
10605	Interpret information concerning temperature (°C)
10806	Convert imperial measure of length, mass and volume to metric measure using an appropriate conversion table
10604	Know average seasonal temperatures (°C) in Ireland
10504	Interpret, without calculation, diagrammatical representation of data including pie chart

Consumer Maths 1.

Procedure	**Procedure Name**
10206	Write an answer to a money calculation correct to the nearest penny
10209	Add, subtract, multiply and divide decimals
10210	Correctly use the % key to find a percentage of a number
10101	Roughly estimate the outcome of a calculation involving one of +, -, x, ÷ by rounding to the nearest whole number, 10, 100, etc.
10201	Perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits
10202	Obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷
10203	Correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length
10204	Express natural numbers ≤ 8 digits in word and digit form
10205	Round off natural numbers ≤ 8 digits

10805	Do simple problems involving 10804
10806	Convert imperial measure of length, mass and volume to metric measure using an appropriate conversion table
10301	Know the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century
10302	Use and interchange the units and concepts set out in procedure 1301
10303	Read time from the traditional clock
10304	Use the a.m / p.m format for time
10305	Use the 24 hour format for time
10306	Interchange a.m / p.m format and 24 hour format
10307	Add and subtract in each time format
10504	Interpret, without calculation, diagrammatical representation of data including pie chart
10701	Estimate the measure of everyday materials in cm / m , g / kg and ml / l
10804	Interpret quantitative information on labelled goods

Procedure	**Procedure Name**
10208	Convert a proper fraction to a decimal, correct to two decimal places
10209	Add, subtract, multiply and divide decimals
10101	Roughly estimate the outcome of a calculation involving one of +, -, x, ÷ by rounding to the nearest whole number, 10, 100, etc.
10301	Know the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century
10302	Use and interchange the units and concepts set out in procedure 1301
10303	Read time from the traditional clock
10304	Use the a.m / p.m format for time
10305	Use the 24 hour format for time
10306	Interchange a.m / p.m format and 24 hour format
10307	Add and subtract in each time format
10308	Interpret a timetable e.g bus, train, aeroplane etc.
10309	Do simple problems involving travel timetables, work rosters etc.
10204	Express natural numbers ≤ 8 digits in word and digit form
10205	Round off natural numbers ≤ 8 digits
10206	Write an answer to a money calculation correct to the nearest penny
10210	Correctly use the % key to find a percentage of a number
10203	Correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length
10202	Obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷
10201	Perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits

10504	Interpret, without calculation, diagrammatical representation of data including pie chart
11201	Convert wage to annual / monthly / weekly payments as required
11203	Calculate hours worked from a time card and calculate wage using a flat hourly rate of pay
10404	Calculate inverse proportion eg. if it takes 3 people 6 days to build a wall, how long would it take 2 people to build the same wall
11301	Calculate wage using piecework rates
11302	Calculate wage on the basis of commission
11303	Calculate wage based on basic hourly rate plus overtime (time and a quarter, time and a half, double time, treble time)
11304	Calculate taxable income, given gross pay and tax free allowance

Communication Maths 1.

Procedure	Procedure Name
10204	Express natural numbers ≤ 8 digits in word and digit form
10205	Round off natural numbers ≤ 8 digits
10206	Write an answer to a money calculation correct to the nearest penny
10207	Write a decimal number correct to a specified number of decimal places
10208	Convert a proper fraction to a decimal, correct to two decimal places
10209	Add, subtract, multiply and divide decimals
10210	Correctly use the % key to find a percentage of a number
10211	Use the √ key correctly
10201	Perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits
10202	Obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷
10203	Correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length
10101	Roughly estimate the outcome of a calculation involving one of +, -, x, ÷ by rounding to the nearest whole number, 10, 100, etc.

10301   Know the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century

10302   Use and interchange the units and concepts set out in procedure 1301

10303   Read time from the traditional clock

10304   Use the a.m / p.m format for time

10305   Use the 24 hour format for time

10306   Interchange a.m / p.m format and 24 hour format

10307   Add and subtract in each time format

10501   Collect and record data

10502   Classify collected data

10503   Present classified data in statistical form i.e. bar chart, histogram with equal class intervals, trend chart, tree diagram

10504   Interpret, without calculation, diagrammatical representation of data including pie chart

11001   Estimate the degree measure of an angle in the range 0 to 360 degrees

11002   Use a protractor to find the degree measure of an angle

11003   Construct a right angle using a set square

11004   Construct angles of given degree measure using a protractor

11006   Construct a circle of given radius using a geometrical compass

10901   Calculate the probability of an event in simple cases, with probability treated as relative frequency i.e. for equally likely outcomes,

10902   Calculate which outcome of two events is more likely by comparison of the probabilities expressed as decimals

10903   Calculate the expected outcome of a series of trials by multiplying the probability of an event by the number of trials, and distinguishing

Procedure	**Procedure Name**
10101	Roughly estimate the outcome of a calculation involving one of +, -, x, ÷ by rounding to the nearest whole number, 10, 100, etc.
10201	Perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits
10202	Obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷
10203	Correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length
10204	Express natural numbers ≤ 8 digits in word and digit form
10205	Round off natural numbers ≤ 8 digits
10206	Write an answer to a money calculation correct to the nearest penny
10209	Add, subtract, multiply and divide decimals
10301	Know the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century
10302	Use and interchange the units and concepts set out in procedure 1301
10303	Read time from the traditional clock
10304	Use the a.m / p.m format for time

10305	Use the 24 hour format for time
10306	Interchange a.m / p.m format and 24 hour format
10307	Add and subtract in each time format
10504	Interpret, without calculation, diagrammatical representation of data including pie chart
10701	Estimate the measure of everyday materials in cm / m , g / kg and ml / l
10702	Use a measuring tape / ruler to measure straight line lengths and obtain the dimensions of rectangular figures
10703	Record measurements on a sketch diagram
10704	Accurately use weighing scales calibrated in g / kg
10705	Accurately use graduated vessels
10706	Convert measurements from a simple scale drawing to true values
10707	Find the length of the perimeter of a rectilinear shape

Procedure	Procedure Name

11001   Estimate the degree measure of an angle in the range 0 to 360 degrees

11002   Use a protractor to find the degree measure of an angle

11003   Construct a right angle using a set square

11004   Construct angles of given degree measure using a protractor

11005   Construct a rectangle to given dimensions

11006   Construct a circle of given radius using a geometrical compass

10401   Divide a quantity in a given ratio

10402   Divide a quantity in proportion eg a sum of money in proportion to age

10403   Increase and decrease quantities in a given ratio eg. cooking recipe

10404   Calculate inverse proportion eg. if it takes 3 people 6 days to build a wall, how long would it take 2 people to build the same wall

10601   Take a reading from a scaled thermometer

10602   Convert between Fahrenheit, Celsius and Gas Mark using conversion tables

10603   Know the temperature of the freezing point of water, the boiling point of water and normal body temperature in degrees Celsius

10604   Know average seasonal temperatures (°C) in Ireland

10605	Interpret information concerning temperature (°C)
10801	Calculate the area of a rectangle by substituting into the formula L x B
10802	Calculate the area of a triangle by substituting into the formula (base x height) / 2
10803	Calculate the area of a parallelogram by substituting into the formula h x (a + b)/2
10804	Interpret quantitative information on labelled goods
10805	Do simple problems involving 10804
10806	Convert imperial measure of length, mass and volume to metric measure using an appropriate conversion table
11101	Construct a triangle given the lengths of three sides using a geometrical triangle
11102	Construct a right angle using a 3:4:5 right angled triangle

Appendix F

The mathematical content of the LCA course, spread over three half-year sessions, by means of three *modules* named *Maths for Everyday Life, Maths for Leisure and Travel*, and *Maths for the Consumer*.

Module 1: Maths for Everyday Life

Procedure	Procedure Name	Notes
10101	Roughly estimate the outcome of a calculation involving one of +, -, x, ÷ by rounding to the nearest whole number, 10, 100, etc	Mental arithmetic in social contexts such as shopping, entertainment etc. Estimating change (money).
10201	Perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits	Graded everyday examples promoting calculator use.
10202	Obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷	Quick calculations on calculator : problems presented orally (as in telephone enquiry) or from written text.
10203	Correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length	Example: effect of changing a digit in a meter reading. National Lottery.
10204	Express natural numbers ≤ 8 digits in word and digit form	Conversion from one to the other - importance in telephone communication etc. Oral and written exercises.
10205	Round off natural numbers ≤ 8 digits	Rounding to nearest 10, 100 etc. Oral and written work.

Block A   Bills and Everyday Commercial Transactions continued.

Procedure	Procedure Name	Notes
10206	Write an answer to a money calculation correct to the nearest penny	Bills and other everyday commercial transactions - calculator use.
10208	Convert a proper fraction to a decimal, correct to two decimal places	Calculation of a fraction of a given amount.
10209	Add, subtract, multiply and divide decimals	In money contexts working to two places of decimals - rounding to nearest penny.
10210	Correctly use the % key to find a percentage of a number	% increase / decrease in prices expressed in money terms. New prices after application of % increase or % discount.

Block B   Using Time

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Procedure	Procedure Name	Notes
10301	Know the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century	Time in school expressed in time per day, per week, per year. Appropriateness of each unit of time for various events : a life, a journey, cooking time, welding time, microwave, growth of plants, trees etc.
10302	Use and interchange the units and concepts set out in procedure 10301	Oral and written work : problems set in contexts as indicated in 10301
10303	Read time from the traditional clock	Social contexts.
10304	Use the a.m / p.m format for time	Setting digital clock - alarm- video - microwave - domestic timing devices
10305	Use the 24 hour format for time	Study timetables - domestic equipment. School timetables. Cooking times. TV times.
10306	Interchange a.m / p.m format and 24 hour format	Social contexts.

Block B   Using Time continued.

Procedure	Procedure Name	Notes
10307	Add and subtract in each time format	School and work timetables. Hours of opening for public services, public offices, businesses etc.
10308	Interpret a timetable e.g bus, train, aeroplane etc	Realistic cases.
10309	Do simple problems involving travel timetables, work rosters etc	

Procedure	Procedure Name	Notes
11001	Estimate the degree measure of an angle in the ranges 0 to 90, 90 to 180, 180 - 360 degrees	Preparatory skill associated with the drawing of patterns, frameworks etc and the drawing and interpreting of diagrams used for the presentation of data.
11002	Use a protractor to find the degree measure of an angle	Preparatory skill associated with the drawing of patterns, frameworks etc and the drawing and interpreting of diagrams used for the presentation of data.
11003	Construct a right angle using a set square	Preparatory skill associated with the drawing of patterns, frameworks etc and the drawing and interpreting of diagrams used for the presentation of data.
11004	Construct angles of given degree measure using a protractor	Preparatory skill associated with the drawing of patterns, frameworks etc and the drawing and interpreting of diagrams used for the presentation of data.
11006	Construct a circle of given radius using a geometrical compass	Preparatory skill associated with the drawing of patterns, frameworks etc and the drawing and interpreting of diagrams used for the presentation of data.
11007	Calculate the area of a disc using the formula πr^2, with 3.14 as an approximation for π.	Preparatory skill associated with the drawing of patterns, frameworks etc and the drawing and interpreting of diagrams used for the presentation of data.

Block D   Communicating Maths

Procedure	Procedure Name	Notes
10501	Collect and record data	Series of graded surveys - emphasis on questions such as : What sort of data will be expected ? - What sort of information is to be extracted? - What sort of recording scheme is appropriate?
10502	Classify collected data	Use of frequency table . Idea of grouped frequency.
10503	Present classified data in statistical form i.e. bar chart, histogram with equal class intervals, trend chart, tree diagram, π chart	Advantages of each method. Survey newspapers and magazines for examples of each method.
10504	Interpret, without calculation, diagrammatical representation of data including pie chart and flow diagram.	Examples from various media. Issues such as population, health statistics etc.
10505	Calculate mean, mode and median	Idea of a representative figure for a population - examples from social statistics, child care etc. Elementary notion of dispersion.

Block E   Income and Wages

Procedure	Procedure Name	Notes
11201	Convert wage to annual / monthly / weekly payments as required	Oral and written work - use of calculator.
11203	Calculate hours worked from a time card and calculate wage using a flat hourly rate of pay	Realistic cases - time cards from local firms etc.
10404	Calculate inverse proportion eg. if it takes 3 people 6 days to build a wall, how long would it take 2 people to build the same wall	Costing small building works, horticulture, catering, temping etc.
11301	Calculate wage using piecework rates	Realistic cases.
11302	Calculate wage on the basis of commission	Case studies of various occupations.
11303	Calculate wage based on basic hourly rate plus overtime (time and a quarter, time and a half, double time, treble time)	Case studies.

Block E   Income and Wages continued.

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Procedure	Procedure Name	Notes
11304	Calculate taxable income, given gross pay and tax free allowance	Case studies.
11305	Other wage deductions : PRSI, Pension, Holiday Funds, Union Dues, VHI, Credit Union etc.	Purpose of deduction. Realistic cases.

Module 2: Maths for Leisure and Travel

Procedure	Procedure Name	Notes
10901	Calculate the probability of an event in simple cases, with probability treated as relative frequency i.e. for equally likely outcomes, probability = $\dfrac{\text{number of outcomes of interest}}{\text{number of possible outcomes}}$	Card drawing - one or two cards. Sex distribution. Coin tossing. Birthday distribution.
10902	Calculate which outcome of two events is more likely by comparison of the probabilities expressed as decimals	Card drawing - one or two cards. Sex distribution. Coin tossing. Birthday distribution.
10903	Calculate the expected outcome of a series of trials by multiplying the probability of an event by the number of trials, and distinguishing between expected outcome and actual outcome	Card drawing - one or two cards. Sex distribution. Coin tossing. Birthday distribution.

Block G   On the Road!

Procedure	Procedure Name	Notes
10504	Interpret, without calculation, diagrammatical representation of data including pie chart	Geographical study of a country. Population. Seasonal temperatures. Standard of living. Occupations etc.
10706	Convert measurements from a simple scale drawing to true values	Map work, distances on maps. Using Ordinance Survey maps. Scaled maps.
10604	Know average seasonal temperatures (˚C) in Ireland	Travel brochures. Newspaper, TV weather reports.
10605	Interpret information concerning temperature (˚C)	Travel brochures.
10807	Do simple calculations involving speed, time and distance using d = t x s.	Planning journey times - allowances for speed limits, traffic, stops etc.
10808	Use d = t x s formula to solve for one unknown.	Planning journey times - allowances for speed limits, traffic, stops etc.

Block G   On the Road! Continued.

Procedure	Procedure Name	Notes
10809	Name and recognise common currencies within EU, America and Japan.	Newspapers, Banks, Bureau de Change.
10810	Convert currencies using simple exchange rates. Distinguish between the terms "BUY" and "SELL".	Transactions in Bank or Bureau de Change - newspapers as sources of exchange information.
10811	% commission and fixed charge on money changing transactions.	Transactions in Bank or Bureau de Change.
10606	Convert between Fahrenheit and Celsius measures of temperature using appropriate formula.	Travel brochures.

Block H   Hot and Cold Maths.

Procedure	Procedure Name	Notes
10601	Take a reading from a scaled thermometer	Clinical thermometer. Wet Bulb thermometer. Dry Bulb thermometer. Laboratory thermometer.
10602	Convert between Fahrenheit, Celsius and Gas Mark using conversion tables	Recipe conversions.
10603	Know the temperature of the freezing point of water, the boiling point of water and normal body temperature in degrees Celsius	Pasteurisation etc.
10604	Know average seasonal temperatures (˚C) in Ireland	Newspaper and TV weather reports.
10605	Interpret information concerning temperature (˚C)	Travel Brochures etc.

Module 3: Maths for the Consumer.

Block I	Business Maths.

Procedure	Procedure Name	Notes
10210	Correctly use the % key to find a percentage of a number	Prices including VAT etc.
10213	Correctly use the calculator to find original figure given a figure incorporating a % change	Price before VAT, before addition of profit, before removal of a discount.
10214	Know the terms Principle, Interest, Amount; and be able to calculate Simple Interest using the formula $I = \dfrac{P \times R \times T}{100}$	
10215	Know the terms Principal, Interest and Amount and calculate Compound Interest using the formula $A = P(1 + {}^{r}/_{100})^{n}$.	Banks. Credit Cards.
10216	Calculate the difference in interest earned by Simple Interest and Compound Interest for given values of Principle, Rate and Time.	

Block J   Maths for Measurement.

Procedure	Procedure Name	Notes
10701	Estimate the measure of everyday materials in cm / m , g / kg and ml / l	Examples: how many sausages in a 1Kg. or 0.5 Kg. The capacity of an average cup in ml. The mass ('weight') of a cup of flour in g.
10702	Use a measuring tape / ruler to measure straight line lengths and obtain the dimensions of rectangular figures	Examples from classroom etc.
10703	Record measurements on a sketch diagram	
10704	Accurately use weighing scales calibrated in g / kg	Using manual and electronic scales.
10705	Accurately use graduated vessels	Litre jugs. Medicine spoons. Baby's bottle.
10706	Convert measurements from a simple scale drawing to true values	Dimensions of room. Conversions of cm to m.

Procedure	Procedure Name	Notes
10707	Find the length of the perimeter of a rectilinear shape	

Block K   Consumer Information Maths.

Procedure	Procedure Name	Notes
10804	Interpret quantitative information on labelled goods	Food content information. Calorific information. Dilution procedures.
10805	Do simple problems involving 10804	
10806	Convert imperial measure of length, mass and volume to metric measure using an appropriate conversion table.	Use of other similar "ready-reckoner" type conversion tables.

Block L   Fair Shares!

Procedure	Procedure Name	Notes
10401	Divide a quantity in a given ratio	Sums of money etc.
10402	Divide a quantity in proportion	Example: a sum of money divided in proportion to age
10403	Increase and decrease quantities in a given ratio	Example: cooking recipe

Block M   Budgeting, Costing and Planning.

Procedure	Procedure Name	Notes
11403	Know the terms Labour, Time, Materials and Wastage and be able to prepare a costing for a task.	Pricing for a party / wedding, construction / decorating job.
11402	Prepare a detailed time plan for the completion of a task.	Planting a crop. Cooking a meal.
11401	Prepare a budget plan for a household within a fixed income.	Bills, rent, food, transport etc.
11404	Apply the principle of unit cost per unit area to obtain a money estimate involving a given area.	Decorating, carpeting, planting crops, hedging etc.

Block N   Triangle Maths.

Procedure	Procedure Name	Notes
11101	Construct a triangle given the lengths of three sides using a geometrical triangle	Preparatory skills for participation in Construction and other modules.
11102	Construct a right angle using a 3:4:5 right angled triangle	Preparatory skills for participation in Construction and other modules.
11103	Estimate the length of the hypotenuse of a right angled triangle by construction	Preparatory skills for participation in Construction and other modules.
10211	Use the $\sqrt{\ }$ key correctly to a given accuracy.	Preparatory skills for participation in Construction and other modules.
10212	Use the $(\ )^2$ key correctly to a given accuracy.	Preparatory skills for participation in Construction and other modules.
11104	Use the calculator to find the length, to a given accuracy, of the hypotenuse of a right angled triangle, using the Theorem of Pythagoras	Preparatory skills for participation in Construction and other modules.

Block O   Maths in Space.

Procedure	Procedure Name	Notes
10801	Calculate the area of a rectangle by substituting into the formula L x B	
10802	Calculate the area of a triangle by substituting into the formula (base x height) / 2	
10803	Calculate the area of a parallelogram by substituting into the formula h x (a + b)/2	
10815	Calculate the volume of a rectangular solid by substituting into the formula L x B x H	
10812	Estimate the area of an irregular figure by square counting to a given scale.	
11501	Know the principle of conservation of volume under melting and recasting and apply it in simple problems which do not require the solution of equations.	Activities involving modelling clay. Example: a rectangular block 30 x 20 x 10 cm is recast as a cylinder - what is the volume of the cylinder ?

Procedure	Procedure Name	Notes
11503	Know the principle of conservation of volume under melting and recasting and apply it in simple problems which do not require the solution of equations, where a given percentage of volume is lost in the process.	As above - 15% loss in recasting.
11504	Calculate the volume a cylinder to a given accuracy using the formula: $$\frac{\pi d^2 h}{4}$$	Measuring the diameter of a cylinder using Vernier calipers or similar instrument.
11505	Calculate the volume a cone to a given accuracy, with all necessary dimensions given, using the formula: $$\frac{\pi d^2 h}{12}$$	As above.
11506	Calculate the volume a sphere and hemisphere to a given accuracy using formulae: $$\frac{\pi d^3}{6} \text{ and } \frac{\pi d^3}{12}$$	
10813	Use Simpson's Rule to approximate the area of an irregular shape.	
10814	Know the concept of volume of a liquid, solid or gas as the amount of space each occupies.	Hair mousse as an aid to increasing volume. Contents of boxes - volume affected by settling etc.

Block O   Maths in Space continued.

Procedure	Procedure Name	Notes
11502	Know the concept of displacement for a totally immersed body.	Use of graduated vessels to estimate the volume of irregular solids.

Block P   Home Finance.

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Procedure	Procedure Name	Notes
11601	Interpret household bills.	ESB, Telecom, Gas etc.
11602	Interpret household bills and estimate new bills in the light of increased use, change in unit cost .	
11603	Calculate Hire Purchase costs and make a comparison with cash purchase.	ESB - Easy Pay scheme.
11604	Calculate the cost of personal borrowing of a fixed amount of money from a variety of financial institutions over a fixed period of time.	Cost = total interest paid.
11605	Compare the cost of personal borrowing of a fixed amount of money from one financial institution over variable periods of time (years).	
11606	Mortgages - calculate the cost of a mortgage based on £ per thousand per month over a fixed period of years.	Case studies.

Appendix G

The theme component names of the mathematical content of the LCA course, the assessment guide, and the prior requirements.

	Theme Components	Assessment Guide	Requirements
Module 1	Bills and Everyday Commercial Transactions.	A	-
	Using Time.	B	-
	Design Maths.	C	-
	Communicating Maths.	D	-
	Income and Wages.	E	A and B
Module 2	Taking Chances!	F	-
	On the Road!	G	A and B
	Hot and Cold Maths	H	A and D
Module 3	Business Maths.	I	A and B
	Maths for Measurement.	J	C
	Consumer Information Maths.	K	D
	Fair Shares!	L	A
	Budgeting, Costing and Planning.	M	A, B, D, F and
	Triangle Maths.	N	A and C
	Maths in Space.	O	A and C
	Home Finance.	P	A and C

Appendix H

Draft Assessment Items

Module   1   Module Name   Maths for Living

Block   A   Max Score   20   Criterion Score   10

Behavior A1

I   By estimating to the nearest £, estimate the cost of 5 tins of paint @ £3.84 per tin.

Ans = £20
£3.84 ≈ £4
5 x £4 = £20
Note: context used here is shopping, but may be varied at teacher's discretion.

II   By estimating to the nearest 100, estimate the total of 364 + 520 + 189

Ans is 1100
364 ≈ 400
520 ≈ 500
189 ≈ 200
Total 1100

Behavior A2

I   Calculate the cost of 48 boxes of crisps at £12 per box.

Calculator Use
48 x £12 = £576

NB Integer answer.

II   5580÷15

Calculator Use
Ans. 372

NB Integer answer

Module	Module Name	
Block	Max Score	Criterion Score

Behavior A3

I A group of 6 people have saved £2 000 for a holiday. The holiday package costs £258 per person. How much spending money is left in total.

Calculator use.
£256 x 6 = £1 548
£2 000 - £1 548 = £452

II Calculate   4526 x 124 -789

Answer   560 435

Behavior A4

I Your ESB meter reads 14628. Write down the value of the digit 6.

600

II Write down the value of the digit 4 in 4 761 235

4 000 000

Module	Module Name	
Block	Max Score	Criterion Score

Behavior A5

I You win £42 370 in the Lotto. Write down this number in words.

Forty two thousand, three hundred and seventy.

II Write the number one million, four hundred and twenty thousand in digit form.

1 420 000

Behavior A6

I The attendance at a football match was 43 567. Write this number to the nearest 100.

43 600

II Round 5 472 314 to the nearest thousand.

5 472 000

Module	Module Name	
Block	Max Score	Criterion Score

Behavior A7

I Calculate the cost of 8 rolls of wallpaper at £3.99 per roll.

Calculator use
8 x £3.99 = £31.92

II Calculate £112.50 ÷ 4, give your answer correct to the nearest p.

Calculator use
£112.50 ÷ 4 ≈ £28.13

Behavior A8

I A cake is cut into seven equal pieces. You eat three pieces of cake. Express your share of the cake as a decimal, correct to two decimal places.

Calculator use
0.43

II Express 11/43 as a decimal, correct to two decimal places.

Calculator use
0.26

Module	Module Name	
Block	Max Score	Criterion Score

Behavior A9

I A prize of £583.81 is shared equally among three friends. Calculate each person's share, correct to the nearest p.

Calculator use
£194.60

II Calculate

143.42 + 56.9 x 5.4

Calculator use
450.68

Behavior A10

I A coat costing £120 is reduced by 10% in a sale. Calculate the sale price.

Calculator use
£108

II Increase 517 by 21%

Calculator use
625.57

Module   1   Module Name   Maths for Living

Block   B   Max Score   18   Criterion Score   9

Behavior B1

I Calculate the number of seconds in 2 hours.   7 200 seconds

II Calculate the number of months in a century.   1 200 months

Behavior B2

I A student has 42 classes per week, each of length 35   24 hours 30 minutes
minutes. Calculate, in hours and minutes, the total
time spent in class in one week.

II Cooking time for lamb is 20 minutes per pound (lb)   1 hour 30 minutes
plus an additional 20 minutes. Calculate, in hours
and minutes, the cooking time of a 31/2 lb leg of
lamb.

Module   Module Name

Block   Max Score   Criterion Score

Behavior B3

I   Write down the time shown: 5:05   or   5 past 5

    clock shows 5:05

II Draw in hands to show the time "25 to 4" on the   Picture of correct clock face
    clock face:

        blank clock face

Behavior B4

I   A programme starts at 8:20 in the evening. Is this   8:20 pm
    8:20 am or 8:20 pm?

II A plane leaves Dublin Airport at 9:20 am. Is this in   Morning
    the morning or the evening?

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Module	Module Name	
Block	Max Score	Criterion Score

Behavior B5

I A TV programme starts at 20:15 Is this in the morning or the evening?

Evening

II Is the time 00:14 near midnight or midday?

Midnight

Behavior B6

I Write the time 6:15 am in the 24 hour format.

06:15

II Write the time 23:45 in the am/pm format.

11:45 pm

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Module	Module Name	
Block	Max Score	Criterion Score

Behavior B7

I A bank is open each working day from 10 am to 4 pm. How many hours is the bank open each working day.   6 hours

II A train leaves a Dublin station at 18:47 and takes 3 hours 15 minutes to reach Cork. At which time does the train arrive in Cork? (Use 24 hour format).   22:02

Behavior B8

I See timetable.   12

How many trains travel from Dublin to Limerick each weekday?

II Write down the departure time from Dublin of the train which does not run on Fridays.   17:40

Module	Module Name	
Block	Max Score	Criterion Score

Behavior B9

I Use timetable.   09:24

You have a meeting in Port Laoise at 11:30 sharp.
At which time must you catch the train from
Droichead Nua?

II How much time do you have to spare to get from the   Arrival   09:58
railway station in Port Laoise to your meeting?

Meeting 11:30

Subtraction

1 hour 42 minutes

Module   1   Module Name   Maths for Living

Block   D   Max Score   10   Criterion Score   5

Behavior D1

I   You have to do a survey of the number of people   A
    who live in each home in your area. Which of these
    two recording schemes is most suitable?

    A - frequency table

    B- grouped frequency table

II A set of data consists of exam scores of a class   B
    which range from 0% to 100%. Which of these two
    recording schemes is most suitable?

    A - frequency table

    B- grouped frequency table

Behavior D2

I   Here are the numbers of Easter Eggs each student in   0 1 2 3 4 5 6 7 8 9
    a class received:
    5 2 5 3 4 1 2 0 5 2 1 9 8 8 7 3 1 6   1 3 3 2 1 3 1 1 2 1

    Complete the frequency table:

          0 1 2 3 4 5 6 7 8 9

II Use the information from I to complete this grouped   0 - 2   3 - 5   6 - 8   >8
    frequency table:
                                                                  7   6   4   1
    0 - 2   3 - 5   6 - 8   >8

88

Module	Module Name	
Block	Max Score	Criterion Score

Behavior D3

I   Show the data from D2 I on a bar chart   Bar Chart

II Show the data from D2 I on a trend graph   Trend Graph

Behavior D4

I   A student's day is shown on the pie chart. Which   Sleep
    activity takes up most of the time.

        Pie Chart

II From the graph shown below, on which day were   Friday
    sales £5 000 ?

Module	Module Name	
Block	Max Score	Criterion Score

Behavior D5

I The ages of six people are: 54 32 17 25 49 63   40 years old

What is the mean age ?

II Estimate the median of: 9.5

1 12 43 7 53 2

Appendix I

LCA Mathematics Applications - Draft Modules

Leaving Certificate Applied

An Ardteistiméireacht Fheidhmeach

Mathematical Applications

Mathematical Applications

Maths

for

Living

1. PURPOSE

The purpose of this module is, through practical applications, to develop the skills and confidence of pupils in the subject of mathematics and to encourage them to recognise its use in everyday life.

2. PREREQUISITES

None.

3. AIMS

- To promote practical applications.
- To teach the use of calculations.
- To stimulate the interest and enthusiasm of students in identifying and solving problems.
- To identify and eliminate weakness in students' skills.
- To develop an understanding of statistics and statistical methods.
- To develop skills of analysis and data presentation.
- To develop an understanding of the units of time and their uses.
- To teach the correct and accurate use of mathematical instruments.
- To develop pupils abilities to undertake problems involving mental arithmetic.
- To develop pupils confidence in dealing with problems associated with wages, allowances etc.
- To demystify maths.

4. UNITS

Unit 1	Bills and everyday commercial transactions
Unit 2	Using time
Unit 3	Design maths
Unit 4	Communicating maths
Unit 5	Income and wages

Unit 1: Bills and everyday commercial transactions

Students should be able to:

- roughly estimate the outcome of a calculation involving one of the operations of addition, subtraction, multiplication, division by rounding to the nearest whole number, 10,000 etc;

  mental arithmetic in contexts such as shopping, entertainment etc. subtraction, Estimating change (money);

- perform accurately the operations +, -, x, ÷ on natural numbers ≤ 6 digits;

  graded everyday examples promoting calculator use;

- obtain the correct answer when given a word problem whose solution requires two of the operations +, -, x, ÷;

  quick calculations on calculator: problems presented orally (as in telephone enquiry) or from written text;

- correctly write down the value of a digit based on its position in a natural number ≤ 8 digits in length, example: effect of changing a digit in a meter reading. National Lottery.

- express natural numbers ≤ 8 digits in word and digit form;

  conversion from one to other - importance in telephone communication etc. Oral and written exercises;

- round off natural numbers ≤ 8 digits;

  rounding to nearest 10, 100 etc. Oral and written work;

- write an answer to a money calculation correct to the nearest penny;

  bills and other everyday commercial transactions - calculator use.

- convert a proper fraction to a decimal, correct to two decimal places.

  calculation of a fraction of a given amount;

- add, subtract, multiply and divide decimals in money contexts working to two places of decimals - rounding to nearest penny;

- correctly use the % key to find a percentage of a number;

  % increase/decrease in prices expressed in money terms. New prices after application of % increase or % discount.

Unit 2: Using Time

Students should be able to:

- demonstrate knowledge of the units of time: seconds, minutes, hours, days, weeks; and the terms: month, year and century;

  time in school expressed in time per day, per week, per year. Appropriateness of units of time for various events: a life, a journey, cooking time, welding time, microwave, growth of plants, trees etc;

- use and interchange the units and concepts set out above;

  oral and written work: problems set in contexts as indicated above;

- read time from the traditional clock;

  social contexts;

- use the a.m./p.m. format for time;

  setting digital clock-alarm-video -microwave - domestic timing devices;

- use the 24 hour format for time;

  study timetables - domestic equipment. school timetables. cooking times. TV times;

- interchange a.m./p.m. format and 24 hour format;

  social contexts;

- add and subtract in each time format;

  school and work timetables. Hours of opening for public services, public offices, businesses etc;

- interpret a timetable e.g. bus, train, aeroplane, etc;

  realistic cases;

- do simple problems involving travel timetables, work rosters etc;

Unit 3: Design Maths

Students should be able to:

- estimate the degree measure of an angle ranges 0 to 90, 90 to 180, 180 to 360 degrees;

- use a protractor to find the degree measure of an angle;

- construct a right angle using a set square;

- construct angles of given degree measure using a protractor;

- construct a circle of given radius using a geometrical compass;

- calculate the area of a disc using the formula πr^2, with 3.14 as an approximation for π;

  preparatory skill associated with the drawing of patterns, frameworks etc and the drawing and interpreting of diagrams used for the presentation of data;

Unit 5: Income and Wages

Students should be able to:

- convert wage to annual/monthly/weekly payments as required;

  oral and written work - use of calculator;

- calculate hours worked from a time card and calculate wage using a flat hourly rate of pay;

  realistic cases - time cards from local firms etc;

- calculate inverse proportion e.g. if it takes 3 people 6 days to build a wall, how long would it take 2 people to build the same wall?;

  costing small building works, horticulture, catering, temping etc;

- calculate wage using piecework rates;

  realistic cases

- calculate wage on the basis of commission.

  case studies of various occupations.

- calculate wage based on hourly rate plus overtime (time and quarter, time and a half, double time, treble time).

case studies

- calculate taxable income, given gross pay and tax free allowance.

  case studies

- other wage deductions: PRSI, Pension, Holiday Funds, Union Dues, VHI, Credit Union etc.

  purpose of deduction. Realistic cases.

5. TEACHER GUIDELINES

This module should be taught as far as possible using:

- Active participation
- Practical application
- Discovery learning techniques
- Project work
- Group work
- Class discussion
- Role play

6. CROSS-CURRICULAR LINKS

- Vocational Preparation and Guidance
- Communications
- Information Technology
- Vocational options

7. RESOURCES

- Pocket calculators
- Mathematical instruments
- Photocopy materials
- Overhead projector
- Magazines and newspapers
- Computers
- Calenders

- Timetables (school/work)
- Time cards
- Wage slips

Books

- Maths for Leisure.

  Maths at Large.

  Maths on the Move.

  Maths for Everyday.

  Maths about Town.

  Maths about the Shops,

  by Bill Ridgeway. Published by Arnold.

- **Practical Maths,** by Richards. - Arnold.

- **Everyday Maths,** by Baldwin and Brown. - Arnold.

- **Everyday Maths with a Calculator** by C.J. Harmer. - Arnold.

- **Mathematics the basic skills,** by L. Levellyn, Stanley Thornes and Greer. Educa House.

- Key **Maths Series,** - Stanley Thornes.

- **Mathematics for Technicians,** - Stanley Thornes.

- **Century Maths,** - Stanley Thornes

- **An Enterprising Approach to Mathematics.** - Durham University, Business School.

- **Numbers in a City.** - Inner London Education Authority.

- **Numeracy in Construction.** - ILEA Longmans

- **Crediting Numeracy.** - Adult Literacy, Basic Skills Unit (ALBSU)

- **Maths at Work Series,** by Austwick and Richards. - Cambridge Education.

- **Foundation Maths 1 & 2.** By Oliver and Boyd - Edinburgh.

- **Mathematics for the Future,** by Jim Miller. - Graham Newman Nelson M.S.M.

- **Mathematics 4 W & 5W.** - Nelson.

- Brain Busters (Problem Solving Activity),
  by Peter Toms. - Hodder and Staughton

- Read Life Problems, by Garry Norman.
  - Hodder and Staughton.

Videos

- Maths Counts Series, Independent
  Television.

Maths

for

Leisure

1. PURPOSE

The purpose of this module is, through practical application, to develop the skills and confidence of pupils in the subject of mathematics and to encourage them to recognise its use in the world of work.

2. PREREQUISITES

None.

3. AIMS

- To promote practical applications

- To increase skill in use of calculator

- To stimulate interest and enthusiasm of pupils in identifying and solving problems

- To develop an understanding of the concept of probability

- To further expand statistical techniques

- To introduce manipulation of simple formulae

- To educate pupils in specific areas of mathematical applications associated with paid employment.

- To identify and eliminate weakness in pupil skills

- To further develop ability to use calculator.

4. UNITS

Unit 1:	Taking chances
Unit 2:	On the road
Unit 3:	Hot and cold maths

Unit 1: Taking Chances!

Students should be able to:

- calculate the probability of an event in simple cases, with probability treated as relative frequency i.e. for equally likely outcomes;

  card drawing - one or two cards. Sex distribution. Coin tossing. Birthday distribution;

- calculate which outcome of two events is more likely by comparison of the probabilities expressed as decimals;

- calculate the expected outcome of a series of trials by multiplying the probability of an event by the number of trials, and distinguishing between expected outcome and actual outcome.

Unit 2: On the road

Students should be able to:

- interpret, without calculation, diagrammatical representation of data including pie chart;

  geographical study of a country. Population. Seasonal temperatures. Standard of living. Occupations etc;

- interpret average seasonal temperatures (°C) in Ireland (from travel brochures, newspaper, TV weather reports);

- interpret information concerning temperature (°C);

- convert between Fahrenheit and Celsius measures of temperature using appropriate formula;

- convert measurements from a simple scale drawing to true values;

  map work, distances on maps. Using Ordinance Survey maps, scaled maps.

- do simple calculations involving speed, time and distance using d = t x s;

  planning journey times - allowances for speed limits, traffic, stops etc;

- name and recognise common currencies within EU, America and Japan (using newspapers, banks, Bureau de Change);

- convert currencies using simple exchange rates. Distinguish between the terms "BUY" and "SELL".

  transactions in bank or Bureau de Change - newspapers as sources of exchange information.

- % commission and fixed charge on money changing transactions;

  transactions in Bank or Bureau de Change.

Unit 3: Hot and Cold Maths

Students should be able to:

- take a reading from a scaled thermometer,

  clinical thermometer. Wet Bulb thermometer. Dry Bulb thermometer. Laboratory thermometer;

- convert between Fahrenheit, Celsius and Gas Mark using conversion tables;

  recipe conversions;

- know the temperature of the freezing point of water, the boiling point of water and normal body temperature in degrees Celsius

  pasteurisation etc.

- know average seasonal temperatures (°C) in Ireland;

  newspaper and TV weather reports;

- interpret information concerning temperature (°C);

  travel brochures etc.

6. TEACHER GUIDELINES

This module should be taught as far as possible using:

- Active participation
- Practical application
- Discovery learning techniques
- Project work
- Group work
- Class discussion
- Role play

7. CROSS-CURRICULAR LINKS

- Leisure and Recreation
- Arts Education
- Information Technology
- Social Education

8. RESOURCES

- Pocket calculators
- Mathematical instruments
- Photocopy materials
- Overhead projector
- Magazines and newspapers
- Computers
- Playing cards, coins etc.
- Geographical/Ordnance Survey maps
- Meteorological charts
- Travel brochures
- Conversion tables
- Temperature
- Currency exchange tables

Books

- **Maths for Leisure.**

  Maths at Large.

  Maths on the Move.

  Maths for Everyday.

  Maths about Town.

  Maths about the Shops,

  by Bill Ridgeway. Published by Arnold.

- **Practical Maths,** by Richards. - Arnold.

- **Everyday Maths,** by Baldwin and Brown. - Arnold.

- **Everyday Maths with a Calculator** by C.J. Harmer. - Arnold.

- **Mathematics the basic skills,** by L. Levellyn, Stanley Thornes and Greer. Educa House.

- Key Maths Series, - Stanley Thornes.

- Mathematics for Technicians, - Stanley
  Thornes.

- Century Maths, - Stanley Thornes

- An Enterprising Approach to
  Mathematics. - Durham University, Business
  School.

- Numbers in a City. - Inner London Education
  Authority.

- Numeracy in Construction. - ILEA
  Longmans

- Crediting Numeracy. - Adult Literacy, Basic
  Skills Unit (ALBSU)

- Maths at Work Series, by Austwick and
  Richards. - Cambridge Education.

- Foundation Maths 1 & 2. By Oliver and
  Boyd - Edinburgh.

- Mathematics for the Future, by Jim Miller. -
  Graham Newman Nelson M.S.M.

- Mathematics 4 W & 5W. - Nelson.

- Brain Busters (Problem Solving Activity),
  by Peter Toms. - Hodder and Staughton

- Read Life Problems, by Garry Norman.
  - Hodder and Staughton.

Videos

- Maths Counts Series, Independent
  Television.

Maths

for the

Consumer

1. PURPOSE

The purpose of this module is through practical application to develop the skills and confidence of pupils in the subject of mathematics and to encourage them to recognise its use in the world of the consumer.

2. PREREQUISITES

- Module 1:   Maths for Living

- Module 2:   Maths for Work

3. AIMS

- To promote practical applications.

- To improve skill in the use of calculators.

- To encourage pupils to identify and solve problems.

- To educate pupils in the basic mathematical skills of business.

- To introduce knowledge and skills required for all modes of measurement and scale.

- To teach pupils how to manage, manipulate money.

- To identify and eliminate weakness' in pupils skills.

- To develop pupils abilities to undertake problems involving mental arithmetic.

- To develop pupils confidence in their ability in the subject of mathematics.

- To encourage logical thinking.

4. UNITS

Unit 1:	Business maths
Unit 2:	Maths for measurement
Unit 3:	Consumer information maths
Unit 4:	Fair shares!
Unit 5:	Budgeting, costing and planning
Unit 6:	Triangle maths
Unit 7:	Maths in space
Unit 8:	Home finance

Unit 1: Business Maths

Students should be able to:

- correctly use the % key to find a percentage of a number;

  prices including VAT etc;

- correctly use the calculator to find original figure given incorporating a % change;

  price before VAT, before addition of profit, before removal of a discount;

- know the terms Principle, Interest, Amount; and be able to calculate Simple Interest using the formula:

$$I = \frac{P \times R \times T}{100}$$

- know the terms Principal, Interest and Amount and calculate Compound Interest using the formula:

$$A = P \left(1 + \frac{R}{100}\right)^n$$

  Banks. Credit Cards;

- calculate the difference in interest earned by Simple Interest and Compound Interest for given values of Principle, Rate and Time;

Unit 2: Maths for Measurement

Students should be able to:

- estimate the measure of everyday materials in cm/m, g/kg and ml/l

  examples: how many sausages in a 1Kg. or 0.5 kg. The capacity of an average cup in ml. The mass ('weight') of a cup of flour in g;

- use a measuring tape/ruler to measure straight line lengths and obtain the dimensions of rectangular figures;

  examples from classroom. etc;

- record measurements on a sketch diagram;

- accurately use weighting calibrated in g/kg;

  using manual and electronic scales scales;

- accurately use graduated vessels,

  Litre jugs. Medicine spoons. Baby's bottle;

- convert measurements from simple scale drawing to true values;

  dimensions of a room. Conversions of cm to m;

- find the length of the perimeter of a recti-linear shape.

Unit 2: Consumer Information Maths

Students should be able to:

- interpret quantitative information on labelled goods;

  food content information. Calorific informa-tion. Dilution procedures;

- do simple problems involving such quantitive information;

- convert imperial measure of length, mass and volume to metric measure using an appro-priate conversion table;

  use of other similar "ready-reckoner" type conversion tables.

Unit 4: Fair Shares!

Students should be able to:

- divide a quantity in a given ratio;

  sums of money etc;

- divide a quantity in proportion;

  example: a sum of money divided in propor-tion to age;

- increase and decrease quantities in a given ratio;

  example: cooking recipe;

Unit 5: Budgeting, costing and planning

Students should be able to:

- prepare a budget plan for a household within a fixed income;

  bills, rent, food, transport etc;

- prepare a detailed time plan for the comple-tion of a task;

  planting a crop. Cooking a meal;

- know the terms Labour, Time, Materials and Wastage and be able to prepare a costing for a tasks;

  pricing for a party/wedding, construction/ decorating job;

- apply the principle of unit cost per unit area to obtain a money estimate involving a given area;

  decorating, carpeting, planting crops, hedging etc.

Unit 6: Triangle Maths

Students should be able to:

- construct a triangle given the lengths of three sides using a geometrical triangle;

- construct a right angle using a 3:4:5 right angled triangle;

- estimate the length of the hypotenuse of a right angled triangle by construction;

- use the $\sqrt{}$ key correctly to a given accuracy;

- use the calculator to find the length, to a given accuracy, of the hypotenuse of a right angled triangle, using the Theorem of Pythagoras;

  preparatory skills for participation in Vocational Specialisms.

Unit 7: Maths in Space

Students should be able to:

- calculate the area of a rectangle by substi-tuting into the formula L x B;

- calculate the area of a triangle by substituting into the formula (base x height)/2;

- calculate the area of a parallelogram by sub-stituting into the formula h x (a + b)/2;

- estimate the area of an irregular figure by square counting to a given scale;

- use Simpson's Rule to approximate the area of an irregular shape;

- know the concept of volume of a liquid, solid or gas as the amount of space each occupies;

hair mousse as an aid to increasing volume. Contents of boxes - volume affected by settling etc;

- calculate the volume of a rectangle solid by substituting into the formula L x B x H;

- know the principle of convervation of volume under melting and recasting and apply it in simple problems which do not require the solution of equations;

  activities involving modelling clay. Example: a rectangular block 30 x 20 x 10 cm is recast as a cylinder - what is the volume of the cylinder?

- know the concept of displacement for a totally immersed body;

  use of graduated vessels to estimate the volume of irregular solids;

- know the principle of conservation of volume under melting and recasting and apply it in simple problems which do not require the solution of equations, where a given percentage of volume is lost in the process;

  as above - 15% loss in recasting;

- calculate the volume of a cylinder, to a given degree of accuracy, using the formula:

  $$\frac{\pi d^2 h}{4}$$

  measuring the diameter of a cylinder using Vernier calibers or a similar instrument.

- calculate the volume of a cone to a given degree of accuracy, with all necessary dimensions given, using the formula:

  $$\frac{\pi d^2 h}{12}$$

- calculate the volume of a sphere and hemisphere, to a given degree of accuracy, using the formulae:

  $$\frac{\pi d^3}{6}$$

  and

  $$\frac{\pi d^3}{12}$$

Unit 8: Home Finance

Students should be able to:

- interpret household bills'

  ESB, Telecom, Gas etc;

- interpret household bills and estimate new bills in the light of increased use, change in unit cost;

- calculate Hire Purchase costs and make a comparison with cash purchase;

  ESB - Easy Pay Scheme;

- calculate the cost of personal borrowing of a fixed amount of money from a variety of financial institutions over a fixed period of time;

  cost = total interest paid. Banks. Building Society. Post Office. Credit Union. Leasing. Case Studies;

- compare the cost of personal borrowing of a fixed amount money from one financial institution over variable periods of time (years);

  Banks. Building Society. Post Office. Credit Union;

- mortgages - calculate the cost of a mortgage based on £ per thousand per month over a fixed period of years;

  Case studies.

5. TEACHER GUIDELINES

This module should be taught as far as possible using.

- Active participation.

- Practical application.

- Discovery learning techniques.

- Realistic life cases.

- Project work.

- Group work.

- Class discussion.

- Role play.

6. CROSS-CURRICULAR LINKS

- Vocational Preparation and Guidance.

- Vocational Specialism

- English and Communication

- Information Technology.

7. RESOURCES

- Pocket calculators.

- Mathematical instruments.

- Photocopy materials.

- Overhead projector.

- Magazines newspapers.

- Computers.

- Conversion tables:

  - Length

  - Mass

  - Volume

- Scales and graduated vessels.

- Labelled packaging.

- Vernier calibers.

- Plasticine/modelling clay.

- Log books/list of formula.

- Sample bills (household).

Books

- Maths for Leisure.

  Maths at Large.

  Maths on the Move.

  Maths for Everyday.

  Maths about Town.

  Maths about the Shops,

  by Bill Ridgeway. Published by Arnold.

- Practical Maths, by Richards. - Arnold.

- Everyday Maths, by Baldwin and Brown.
  - Arnold.

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- Read Life Problems, by Garry Norman. - Hodder and Staughton.

Videos

- Maths Counts Series, Independent Television.

Teaching and Learning
in the
Leaving Certificate Applied

- promotes communication skills and personal development

- develops enterprise, co-operation, self-confidence, responsibility, creativity and self-appraisal skills

- promotes co-operation between the school and the local community.

- applies knowledge and skills to the solution of real problems

- develops skills of active learning for life-long education

- treats all participants equally, while recognising differences in gender, interests, aptitudes and abilities.

Appendix J

LCA English and Communications - Draft Modules

Leaving Certificate Applied

An Ardteistiméireacht Fheidhmeach

English & Communication

English and Communication

Communications

and

Enterprise

1. PURPOSE

This module is designed to enable Leaving Certificate Applied students apply communication skills through the transactions of enterprise. The phases of setting up and running a business provide real opportunities to apply speaking, listening, reading and writing skills, and to develop interpersonal communication and co-operative skills. The module affirms the communication skills acquired in Year I and promotes the further expansion of language skills in relation to commerce, business, health and the law.

2. PREREQUISITES

Communications and the Working World, The Communications Media.

3. AIMS

This module aims to enable the student to:

- Speak precisely and coherently to customer and potential customers in a variety of situations related to enterprise,

- Respond flexibly to the constantly changing demands of business and society,

- Practise listening and interviewing skills in specific business situations,

- Acquire clear, legible writing skills in relation to reports, letters, invoices; cheques, receipts, fax messages etc,

- Practise and acquire skills in job applications, preparation and presentation of C.V.s, and the development of interview techniques,

- Develop interpersonal communication and co-operative skills,

- Develop self confidence, creativity, initiative and personal resourcefulness,

- Expand language skills and vocabulary in relation to commerce, business, health and the law,

- Interact effectively with the local community,

- Develop decision-making, problem solving, co-operative and leadership skills.

4. UNITS

Unit 1:	Introduction
Unit 2:	Preparation
Unit 3:	Administration/Production
Unit 4:	Interpersonal Communication
Unit 5:	Case Study - Communications Project
Unit 6:	Language Skills

5. LEARNING OUTCOMES

Unit 1: Introduction

The student will be able to:

- Identify communication skills necessary for participation in an enterprise,

- Review work experience placement in terms of the communication skills he/she used personally in the workplace and the communication observed in the workplace environment,

- Examine and discuss the media coverage of people setting up their own business,

- Interview and/or participate in Visitor Exercise with self employed person,

- Compile list of oral, aural, reading and writing skills needed for participation in an enterprise,

- Prepare a questionnaire to be administered to another class group in relation to communication and enterprise,

- On the basis of personal experience and survey findings list the communication skills that need to be developed for effective participation in an enterprise.

Unit 2: Preparation for Enterprise

The student will be able to:

- Complete an application form for a position in the enterprise,

- Outline the purpose of a C.V.,

- Prepare and present his/her C.V.,

- List the factors to be taken into consideration when preparing for an interview,

- Role play appropriate interview techniques as interviewer and interviewee,

- Participate in interview with external interviewer or enterprise adviser,

- Analyse personal performance at interview based on feedback from interviewer,

- Participate effectively in the visit of the enterprise adviser by listening and asking questions,

- Describe the image created by enterprise name using specific examples and design an appropriate logo,

- Describe orally the management structure of the enterprise and the main functions of each manager,

- List the various managers and the qualities required and suggest whether he/she feels the function would be most effectively carried out by males or females,

- Participate in small group discussion on the possibility of gender destereotyping in the enterprise,

- Discuss and role-play the procedure involved in locating and arranging accommodation for the enterprise including:

  - making necessary appointment - telephone, letter, fax

  - appropriate approach - greeting, explanation of needs etc.

  - negotiation of terms - time, payment, equipment required, responsibilities etc.

- Participate in brainstorming exercise on possible product/service.

Unit 3: Administration / Production

The student will be able to:

- Identify an appropriate approach when selling shares,

- Sell 5 shares in the enterprise and complete the share-record accurately,

- Participate effectively in Visitor Exercise from bank/credit union representative to discuss opening a bank account and/or negotiating a small bank loan,

- Explain the procedure for registering the enterprise,

- Examine the memorandum and articles of association and comment on the use of language,

- Prepare appropriate communication:

  - by letter

  - by phone for researching availability of materials and equipment.

- Design a suitable market research questionnaire on product/service ideas,

- Conduct a market research survey,

- Analyse the market research findings,

- Examine the effectiveness of the questionnaire and the type of information communicated,

- Discuss the procedure involved in ordering and purchasing materials by letter and telephone and practise appropriate techniques,

- Complete copies of the documentation involved i.e. order book, invoice, receipt, cheque, deposit book, enterprise recording documentation etc,

- Discuss and design an appropriate advertising campaign - posters, etc. taking account of target audience, image, logo, slogan and technique they wish to use,

- Prepare a short press release on the enterprise,

- Examine media portrayal of business meetings,

- Outline the procedure for Board of Directors meetings and explain the purpose of minutes and reports,

- Draft a sample agenda for a Board meeting,

- List the points to be included in reports by General Manager, Production Manager, Finance Manager and Personnel Manager,

- Complete business plan,

- Role-plan asking and answering questions on business plan.

Unit 4: Interpersonal Communication

The Student will be able to:

- Communicate effectively with colleagues in the course of the enterprise,

- Discuss the advantages of team work / co-operation and explain the difficulties involved,

- Analyse the procedure at Board of Directors' meetings and comment on the effectiveness of communication,

- Listen effectively to Board Meeting and prepare minutes,

- Understand formal language to be used at meetings, and mode of address,

- Discuss the importance of good interpersonal communication skills in running an enterprise,

- Outline an appropriate strategy for dealing with queries and complaints both verbal and written by letter, telephone and personal contact,

- Outline the importance of communication in relation to safety in the workplace and describe an effective means of communicating health and safety regulations,

- List some of the difficulties that can be caused by poor communication and prepare guidelines on communication for future enterprises,

- Discuss role of industrial relations,

- Discuss procedure and participate effectively in final shareholders meeting.

Unit 5: Case Study - Communications Project

The Student will be able to:

- Participate effectively in group communications project (magazine, newsletter, radio/video programme, drama performance etc)

- Prepare a case study on his/her enterprise for use in the communications project which could include:

  - Group Profile

  - Experience of the interview

  - Experience of management

  - Experience of working in the enterprise itself

  - Experience of dealing with the public

  - Effectiveness of Communication

  - Experience of final shareholders meeting

  - Personal / Group successes

  - Personal / Group difficulties

  - Suggestions for future activities

  - Carry out individual role in communications project eg writing poem, short story, newspaper article, script or perform in drama etc.

Unit 6: Language Skills

The Student will be able to:

- Explain the following health terms:

  - Symptoms

  - Diagnosis

  - Prognosis

  - Prescription

  - Paediatric

  - Geriatric

  - Psychiatric

  - Gynaecological

- Surgical/Medical

- Radiography

- Participate in a visit to local health centre/clinic or Visitor exercise by representative,

- Explain the following legal terms:

  - Contract

  - Deeds/Title

  - Solicitor/Barrister/Judge

  - Circuit Court/District Court/High Court

  - Juvenile Court

  - Juvenile Liaison Officer

  - Probation

  - Conviction

  - In-Camera

  - Examine local paper & report on cases covered and terms used,

- Participate in visit to Courthouse and report on communication used and atmosphere created,

- Explain the following banking terms:

  - Lodgement

  - Withdrawal

  - ATM

  - Credit Card

  - Statement

  - Mortgage

  - Motorloan / Term Loan

- List the various types of account,

- Complete samples of lodgement slip, withdrawal form, Bank Giro form,

- Visit local bank/building society/Credit Union,

- Explain the following terms in relation to Trade Unions:

  - Negotiation

  - Industrial Relations

- Official / Unofficial Picket

- I.C.U.

- S.I.P.T.U.

- I.B.E.C.

- S.M.E.

- Participate in Visitor Exercise by Trade Union representative and report on what he/she learned,

- Explain the following in relation to insurance:

  - Types of cover - home, car, personal etc.

  - Policy

  - Premium

  - Broker

  - Insurance

  - Assurance

6. TEACHER GUIDLINES

This module should be delivered in conjunction with the enterprise module in Vocational Preparation and Guidance as many of the activities overlap. If this is the case then the actual activity i.e making specific product or providing service can be used as the basis for the communications exercises involved here. However, it must be remembered that the focus of this module is on communications in relation to enterprise and is therefore quite different from the understanding of the organisation and management of a business acquired in the other module.

If this module is being delivered independently of other enterprise modules it will be necessary to simulate the transactions involved. The enterprise activity is a group communication project. This can be a magazine, newsletter, radio/video programme, or drama performance. Teh class group forms its own company to carry out this. An organisational structure is set up with specific managerial functions. Each member of the class group plays a specific role within this organisational structure and the group takes responsibility for the final product. The financial aspect may be included if the product has a specific market e.g.

group magazine which could be sold if appropriate. The various communications activities contained in the module are therefore carried out in relation to the group's project.

For all of the activities involved in the module it is necessary to use relevant documentation forms etc, similar to those contained in 'The Minicompany Kit - Administration Documents' need to be used. If possible more up to date versions should be acquired possibly through students' work experience. Equally students could design their own company documents.

Visitors to the class group and out-of-school visits are an essential part of this module. Guidelines on this are contained in Social Education Module - Taking Charge.

7. CROSS-CURRICULAR LINKS

Vocational Preparation & Guidance

Mathematical Applications

Information Technology

Vocational Specialisms (if involved in enterprise activity)

Arts Education

Social Education

Languages

8. RESOURCES

- Enterprising Educators: Helping teachers to teach and children to learn, Enterprise and Industry Education Unit, Duram University.

- Enterprise - an educational resource for 14-19 year olds, Enterprise and Industry Education Unit, Durham University.

- Enterprisein Vocational Education and Training - Skills Development, Enterprise and Industry Education Unit, Durham University

- Management of Enterprise in Education, Enterprise and Industry Education Unit, Durham University

- The Enterprise File, Centre for Education and

Industry, University of Warwick

- It's Your Own Business by Hazel Davies, CRAC/Hobsons publishing

- English Alive! An Introduction to Communications and Everyday English by Eids Leddy and Angela Collins, Gill & Macmillan, Dublin

- Community Enterprise Education in Schools and Colleges Teachers' Handbok by Barbara Merrill, Community Education Development Centre, Coventry

- Community Enterprise Education in Schools and Colleges Training Handbook by Barbara Merrill

- Starting a Business in Ireland by Brian O'Kane, Oak Tree Press, Dublin

- Workwise by Gerry Palmer, Mike Webb, Mac Davison, Beverley Skeggs and Jocelyn Attrill, Trottman and Company, Richmond

- The Enterprising Classroom by Julia Preece (ed.), Centre for Education and Industry, University of Warwick

- Getting Down to Work Creating Jobs in Your Community by Fintan Tallon, Brandon Book Publishers, Dingle

- Minicompany Kit, Shannon Curriculum Development Centre.

9. KEY ASSIGNMENTS

Satisfactory completion of this module will require:

- List of communications skills for enterprise based on research findings,

- Completed application form, c.v. and review of interview,

- Guidelines for good communications,

- Individual contribution to communications project.

Critical Literacy

and

Composition

1.PURPOSE

It is the purpose of this unit to foster in students a mature and critical literacy. This literacy applies to oral and visual contexts as well as written texts. Students will encounter a range of accessible texts to heighten their discrimination and interpretative abilities and enjoy the recreative pleasures associated with the creative play of language. Composing; students will be afforded the opportunity of using language to shape and order experience for themselves. The particular emphasis on creative work and self expression will serve to facilitate personal development and enhanced self esteem.This module and the English and Communication course is concerned with enabling students to express themselves effectively and appropriately. All products of language use, oral, written or visual can be described by the general term text.

2. PREREQUISITES

- English and Communication Module 1 and
- English and Communication Module 2.

3. AIMS

This module aims to enable the student to:

- develop an understanding of the value of literature, film and the electronic media,

- develop powers of discrimination and interpretation,

- develop an interest and enjoyment in using language,

- come to see the arts of speaking, listening, reading and writing as interpretative, creative activities through which specific kinds of meaning can be placed on experience,

- develop an awareness of their own response to texts and analyse and justify that response,

- develop appropriate stances for reasoning and viewing in a range of textual genres e.g. approaching drama from a theatrical perspective,

- comprehend adequately a range of accessible texts for specific purposes,

- viewing films as complex amalgams of images and words; and reading poetry conscious of its specific mode of using language as an artistic medium,

- compose effectively in a range of straightforward genres,

- use language accurately and appropriately by themselves and by this means realise a sense of personal significance,

- use the resources available in the local community.

4. UNITS

Unit 1:	The poetry of popular song
Unit 2:	Poetry
Unit 3:	Short story
Unit 4:	Novel
Unit 5:	Drama
Unit 6:	Film

5. LEARNING OUTCOMES

Unit 1: The poetry of popular song

The student will be able to:

- analyse the lyrics of popular songs,

- use powers of discrimination in his/her experience of popular songs,

- apply critical vocabulary which can also be used when the student encounters poetry. The critical terms to be used are:

  - theme,

  - emotions/atmosphere,

  - Sound: rhyme, rhythm, repetition, figurative language,

  - pictures,

  - comparisons,

- write a personal response to the lyrics that are examined,

- write about a song that has particular meaning or appeal for them,

- write a short poem/song that reflects on her/his feelings and experience,

- comprehend adequately a range of accessible texts for specific purposes,

- conduct a visitor exercise with a local singer or songwriter.

Unit 2: Poetry

The student will be able to:

- read and respond to accessible contemporary poetry,

- compare and contrast poems according to their themes and use of language,

- develop an awareness of their own response to a text and to analyse and justify that response,

- re-read poems for encountering diverse levels of suggestion, inference and meaning,

- relate material to their own experience,

- express opinions clearly,

- be aware of how a poem is different from a piece of prose and how it is read differently,

- examine the patterns of sounds, ideas, words, phrases and lines as they appear in a poem,

- apply critical terminology:
  - theme
  - mood/atmosphere
  - sound: rhythm, rhyme, repetition
  - figurative language: pictures and comparisons

- write an account of the work of a particular poet (3 to 4 poems would suffice),

- compose a short poem based on their own feelings and experiences,

- conduct a visitor exercise with a local poet.

Unit 3: Short story

The student will be able to:

- read a short story critically,

- apply the following critical terms:
  - theme,
  - setting,
  - characterization,
  - climax,
  - narrative voice,

- compare and contrast short stories using a range of critical vocabulary,

- express their opinions clearly,

- justify judgements and interpretations,

- approach a narrative text from a variety of viewpoints using such categories as gender, power and class,

- use the fiction section of a library,

- compose in a range of contexts, anecdote, short story, autobiographical sketch,

- discuss those elements that constitute a good short story,

- conduct a visitor exercise with a local writer.

Unit 4: Novel

The student will be able to:

- read novels and extracts from novels critically,

- analyse a novel under the following headings:
  - plot,
  - theme,
  - characterization,
  - development of the main character,
  - setting,

- write a book review,

- justify their opinions and interpretations,

- compare and contrast novels they have encountered,

- distinguish between the short story and the novel genre,

- discuss the difficulties inherent in adapting a novel for stage or screen,

- use the fiction section of a library,

- write a report on their favourite novelist,

- examine the screen treatment of a novel they have read,

- compose an outline for a proposed novel,

- conduct a visitor exercise with a local writer.

Unit 5: Drama

The student will be able to:

- analyse a piece of drama using the following critical vocabulary:

  - theme,

  - plot,

  - characterization,

  - motivation,

  - setting,

  - dialogue,

  - conflict,

- be aware of the theatrical and performance elements that are essential to a proper understanding of drama,

- perform elements of the drama text they have studied,

- write a report on a visit to a theatre or a theatrical presentation within the school,

- compose individually or in groups a brief drama script,

- be aware of the part played by costumes, lighting, scenery, sets, make-up and music in the theatrical experience,

- prepare a programme for a theatrical performance,

- conduct a visitor exercise with a local director or members of a theatre group,

- experience and appreciate radio and television drama.

Unit 6: Film

The student will be able to:

- conduct a film/video review exercise.

- analyse a film applying the following critical terms:,

  - plot,

  - theme,

  - setting,

  - characterization,

  - conflict,

  - dialogue,

  - visual qualities,

  - special effects,

  - music,

- apply the following technical terms when examining particular scenes:

  - shot,

  - close-up,

  - sequence,

  - longshot,

  - cut,

  - pan,

  - zoom,

  - tracking/dolly shot,

  - crane/aerial shot,

  - subjective shot.

- categorise films according to genre e.g. comedy, thriller, horror, romance.

- appreciate the importance of vision and sound in achieving the cinematic effect.

- write film reviews

- use a story-board to script a scene to be filmed or videotaped,

- compare and contrast the experience of watching a film on video and on a cinema screen,

- make a short video film or take part in a film simulation.

TEACHER GUIDELINES

Unit 1: The Poetry of Popular Song

This unit examines a significant area of popular culture. The analysis of lyrics and the application of critical vocabulary will provide a grounding and preparation for the study of poetry in Unit 2.use lyrics of popular songs for analysis. Recordings of the songs will help students see the words used in their proper context. At least four songs should be analysed.

- students learn to use the following critical vocabulary:

    - theme

    - emotions: moods, atmosphere

    - sound: rhythm, rhyme, repetition

    - figurative language: pictures and comparisons.

- students write a response to each of the songs examined,

- students write about a song that has particular appeal or meaning to them,

- students are encouraged to write a lyric or a poem that reflects on their feelings and experience,

- conduct a visitor exercise with a local singer or songwriter.

Unit 2: Poetry

- use a range of accessible poetry chosen to meet the capabilities of the class group,

- examine the various patterns of sounds, words, ideas, phrases and lines as they appear in the poems,

- poems should be re-read to encounter the diverse levels of suggestion, inference and meaning,

- apply the critical terminology encountered in Unit 1,

- theme,

- emotions, mood, atmosphere,

- sound, rhythm, rhyme, repetition,

- figurative language, pictures,

- comparisons,

- encourage students to develop an awareness of their own response and to analyse and justify that response,

- encourage students to relate the poems to their own experience,

- discuss how poetry is different from prose and how poetry must be read differently,

- write an account of the work of a poet studied by the group. Three to four poems would suffice,

- students are encouraged to write a short poem based on their feelings and experiences.

- conduct a visitor exercise with a local poet. This visit should assist in breaking down the stereotypes associated with poetry and poets.

Unit 3: Short story

- read a range of accessible short stories.

- use the following critical terms and discuss their application:

  - plot,

  - theme,

  - setting,

  - characters,

  - climax,

  - narrator,

- compare and contrast the short stories encountered,

- encourage students to justify judgements and interpretations both in verbal and written form,

- use a radio broadcast or an audio cassette version of a short story. Discuss how the medium differs from the written text,

- students compose in the following contexts:

  - anecdote,

  - autobiographical sketch,

  - short story,

- discuss the elements that constitute a good short story,

- conduct a visit to a school or local library to find examples of short stories in the fiction section. This type of visit is usually conducted in groups of three or four students,

- conduct a visitor exercise with a local short story writer.

Unit 4: Novel

Analyse a novel that is accessible to the students. The novel may be approached as a written text, in extract form, on audio cassette or videotape, apply the following critical vocabulary in the novel analysis:

  - plot,

  - theme,

  - characterization,

  - development of the main character,

  - setting,

- students write a review of the novel studied,

- students compare and contrast the novel with other texts they have encountered,

- distinguish between the short story and the novel genres. A substantial input by the teacher may be required,

- discuss the difficulties associated with adapting a novel for stage or screen,

- write a report on a favourite novelist,

- compose an outline for a novel,

- conduct a visitor exercise with a local writer.

Unit 5: Drama

Select an appropriate and accessible drama text.

- analyse the text making use of the following critical terms:

  - plot,

  - theme,

  - characterization,

  - motivation,

  - setting,

  - dialogue,

  - conflict,

- emphasis is to be placed on the theatrical and performance aspects of drama,

- students perform some elements from the text they are studying on a group basis,

- listen to a radio drama production,

- analyse a televised drama production,

- compose individually or in groups a brief drama script,

- perform the scripts,

- prepare a programme for a theatrical performance of the text studied that would be informative and reader friendly,

- write a report on a visit to a theatre or a theatrical performance within the school,

- conduct a visitor exercise with a director or members of a local drama group.

Unit 6: Film

Conduct a film or video review exercise.

- view and discuss a television film review programme, categorise films according to genres,

- analyse a film or films applying the following critical terms:

  - plot,

  - theme,

  - characterization,

  - setting,

  - conflict,

  - visual qualities,

  - music,

  - special effects,

- analyse a film sequence or sequences applying the following technical terms:

  - shot,

  - dolly/tracking shot,

  - sequence,

  - crane/aerial shot,

  - cut,

  - subjective shot,

  - pan,

  - dialogue,

  - zoom,

  - close up,

- voice over,

- longshot,

- write a film review,

- use a storyboard to script a scene to be filmed or videotaped,

- make a short video or take part in a film simulation,

- visit a cinema. Compare and contrast the visit with the experience of viewing films on video,

- view a film in another language.

7. CROSS-CURRICULAR LINKS

This module links directly to Arts Education. There is provision to view films and perform drama scripts in another language. There are many applications of Information Technology which are relevant to this module, such as the anthologising and presentation of the student's creative work. The skills of critical literacy and effective and appropriate communication are vital to the success of the Leaving Certificate Applied

8. RESOURCES

- Spangles - Transition year English (Folens), by Declan O'Neill, songs pages 45 - 53, film appreciation pages 173 - 189.

- Reading Literature by Don Munro (Macmillan, Australia).

- Class Acts, Carmel Cullen (Folens).

- Words Large as Apples, Teaching poetry 11 - 18 by Hayhoe & Parker (Cambridge Educational).

- Writing Workshop by Richard McRoberts (Macmillan, Australia).

- Drama Guidelines by O'Neill, Lambert, Linnell and Ware-Wood (Heineman)

9. KEY ASSIGNMENTS

Key assignments, for satisfacuory completion of this module are:

Textual Study

The student makes an in-depth study of any one of the following categories of text:

- Unit 1: The work of a songwriter or group,

- Unit 2: The work of a contemporary poet,

- Unit 3: A short story writer or anthology,

- Unit 4: A novel,

- Unit 5: A play,

- Unit 6: A film.

Particular emphasis will be placed on the student's understanding of the conventions of the genre chosen and the quality of the personal response to the text.

Composition

The students presents a sample of his/her creative work. The categories of studentwork envisaged are songs, poems, short stories, drama scripts, short film scripts; an account of a performance by the student or in which the student played a role in producing. A report of approximately 500 words would be presented for student task one and student task two.

Teaching and Learning
in the
Leaving Certificate Applied

- promotes communication skills and personal development

- develops enterprise, co-operation, self-confidence, responsibility, creativity and self-appraisal skills

- promotes co-operation between the school and the local community.

- applies knowledge and skills to the solution of real problems

- develops skills of active learning for life-long education

- treats all participants equally, while recognising differences in gender, interests, aptitudes and abilities.

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